ONTARIO PARKS

Bronte Creek

Vegetation Management Plan

Ontario

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Approval Statement

I am pleased to approve the Bronte Creek Vegetation Management Plan. This plan has been developed to meet the commitment of the *Bronte Creek Management Plan* (1998) to prepare a vegetation management strategy for the park. It has also been developed in accordance with *A Class Environmental Assessment for Provincial Parks and Conservation Reserves* (2005). This document recommends specific management techniques and provides guidelines for vegetation issues facing park managers.

This plan will be reviewed periodically to address changing issues of conditions and advances in vegetation management practices.

I extend my sincere thanks to all those who participated in the consultation process. All comments received were carefully considered during the preparation of this document.

Yours truly;

Peter Sturdy
Zone Manager
Southwest Zone, Ontario Parks.

February 11, 2008
Date

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1.0 INTRODUCTION

1.1 Location and Site Description

Bronte Creek Provincial Park is an oasis in a developing urban landscape. Located within the Regional Municipality of Halton immediately north of the Queen Elizabeth Way on the Burlington-Oakville boundary (Figure 1), the park is surrounded by three major highway arteries. It is a recreation class park, 689 ha in size and development continues to expand along all its boundaries (OMNR 1998).

1.1.1 Regional Ecology

Bronte Creek is located in Ecoregion 7E, and more specifically Ecodistrict 7E-4 (Crins and Uhlig 2000, Crins 2002). Hills (1959) described Ecodistrict 7E-4 as "a plain of water-laid and ice-laid deposits of clay and loam, moderate to high in lime content". Typical vegetation consists of forests composed of Sugar Maple (*Acer saccharum*), American Beech (*Fagus grandifolia*), various species of Oak (*Quercus spp.*), Hickory (*Carya spp.*), and Ash (*Fraxinus spp.*) (Hills 1959).

The boundaries of Ecoregion 7E are an almost perfect match for Rowe's Deciduous Forest Region, and in particular the Niagara Section (Rowe 1972). Rowe describes the Deciduous Forest Region as a small portion of the Eastern Deciduous Forest, which is widespread in the eastern United States, and extends only slightly into Canada in southwestern Ontario between lakes Huron, Erie and Ontario. The region is characterized by broadleaved trees typical of the Great Lakes-St. Lawrence Forest Region, mixed with a number of other broadleaved species that are more commonly found to the south in the eastern United States. These southern species have the northern limits of their range in this part of Ontario. In explaining the presence of these southern species, Rowe points to the favourable climatic conditions created by the moderating effects of the Great Lakes, and the rich soil conditions found in this part of the province.

The southern flavour of southwestern Ontario has led many authors to refer to the Deciduous Forest Region as the Carolinian Zone, based on the presence of trees similar to those found much further south in the eastern United States (i.e., Northern and Southern Carolina) (Fox and Soper 1952, 1953, 1954, Allen *et al.* 1990, Theberge 1989, Waldron 2003). It is within the Carolinian Zone that the highest frequencies of rare and endangered flora and fauna are found in Canada.

1.1.2 Soils and Physiography

The bedrock of Bronte Creek Provincial Park is formed by the red shales of the Queenston formation, emerging to the surface at the southern park boundary north of the Queen Elizabeth Way. A buried bedrock valley is exposed at the surface, along the east side of the park further north of the Queen Elizabeth Way (OMNR 1983).

Bronte Creek Provincial Park is located in the south slope physiographic region (Chapman and Putnam 1984) and is characterized by a deep, narrow, winding gorge cut through till and shale of the Queenston formation that covers the park (Hanna 1984, NHIC 2005). The park is located on the Halton Till Plain with sand deposits from glacial Lake Iroquois restricted to the southern area of the park near the Queen Elizabeth Way (OMNR 1983).

Common soils in Ecodistrict 7E-4 include grey-brown podsolics in well drained areas and dark grey gleisolic soils. Superimposed brown podsolic profiles are not as well developed as they are in Ecoregion 6E to the north (Hills 1959). The soils in the park are derived from the Halton Till plain and described as well drained Oneida clay loam and imperfectly drained Chinguacousy clay loams (Goodban 2002) becoming more clayey as distance from the river valley increases (House and Carleton 1988).

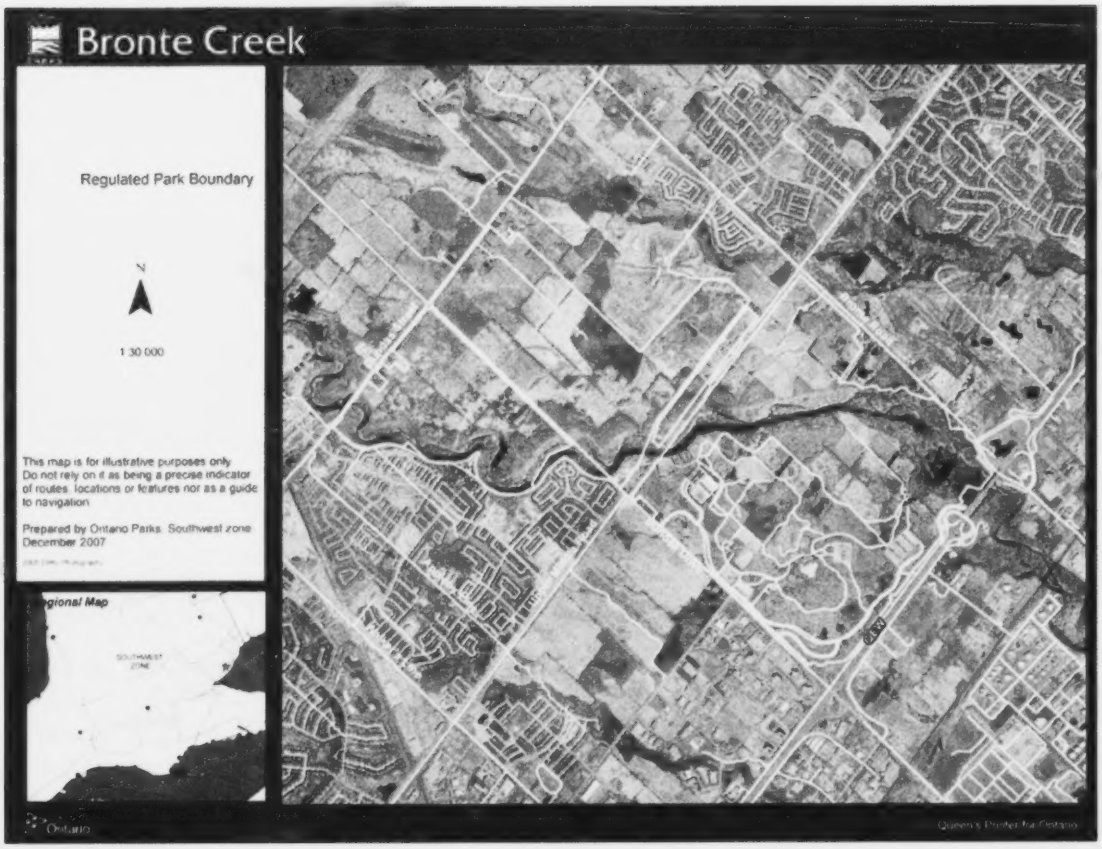
Bronte Creek
Regulated Park Boundary
N
1:30,000
This map is for illustrative purposes only. Do not rely on it as being a precise indicator of routes, locations or features nor as a guide to navigation
Prepared by Ontario Parks, Southwest zone, December 2007
Ontario

Figure 1: Regional and Local Setting

1.1.3 Park Use

The Bronte Creek valley forms a natural barrier that divides the park into two distinctive landscapes (Figure 2) (OMNR 1998). The area north and east of the river valley offers overnight camping facilities and is used by hikers, mountain bikers, dog walkers, and anglers and has traditionally been used for farming (OMNR 1998). The area south of the valley is accessed off Burloak Drive and offers a variety of day use facilities and activities such as:

- Family and group picnic facilities;
- A children's farm;
- A working turn-of-the century farm and museum;
- Nature programs and exhibits;
- A variety of sports amenities and popular seasonal activities such as sunbathing, swimming, tobogganing, skating;
- Park events, including those organized by Friends of Bronte Creek, the community and private sponsors;
- Recreational equipment rentals and fast food services;
- Trails including a fitness trail and opportunities for cycling, hiking and cross-country skiing (OMNR 1998).

1.1.4 Previous Vegetation Inventories

House and Carleton's (1988) *Life Science Inventory of Bronte Creek Provincial Park* lists 19 vegetation communities broken down by upland, north-facing slope, south-facing slope and floodplain community types and identifies 623 vascular plant species. Being located in Carolinian Zone, it is home to several regionally rare / significant species including a number of species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and OMNR (House and Carleton, 1988, NHIC 2007). There are also remnant grassland communities located on the north side of the river valley (Goodban 2002).

1.1.5 Zoning

For the purposes of this report, both zoning and vegetation communities are described under three different headings "The Valley", "The Day Use Side" and "The Campground Side" due to the fact that these are logical ecological and management units within the park.

There are four designated management zones within the park as identified by the park management plan (OMNR 1998); nature reserve zones, natural environment zones, historical zones, and development zones (Figure 2), which are described in further detail below.

The Valley

The Valley Nature Reserve Zone (NR)

The Bronte Creek river valley encompasses an area of 175.6 ha and is a Provincially Significant Area of Natural and Scientific Interest (ANSI) (OMNR 1998). Because of its significant natural features, the valley is classified as nature reserve zone (Figure 2) (OMNR 1998).

The Valley Nature Reserve Zone contains the vegetation communities found within the Bronte Creek river valley including floodplain communities, forested valley slopes and forested tablelands along the valley rim. The north-facing slopes tend to have higher conifer content than south-facing slopes and Carolinian species can be found growing in the zone (OMNR 1998).

The Day Use Side

The south section is the primary day use area within the park and has the majority of the existing facilities (Figure 2). This area borders the north-facing slope vegetation communities of the Bronte Creek valley.

This area includes three of the different park management zones (OMNR 1998) (Figure 2):

Development Zone

D1 Oasis: This area is 175 ha in size and includes the parking lots, picnic areas, swimming pool and many of the recreational facilities that the park offers.

Historical Zones

H1 Spruce Lane Farm: This area is 45.8 ha in size with an agricultural land base.

H2 Heritage Orchards: This area is 8.4 ha in size and has vineyards and old orchards.

H3 Dig South: This area is 2.5 ha in size and is a provincially significant archaeological site.

Natural Environment Zone

NE1 Maple Sugar Woodlot: This area is 34.9 ha in size and consists of upland woodlots, some adjacent planted trees and old fields (OMNR 1998).

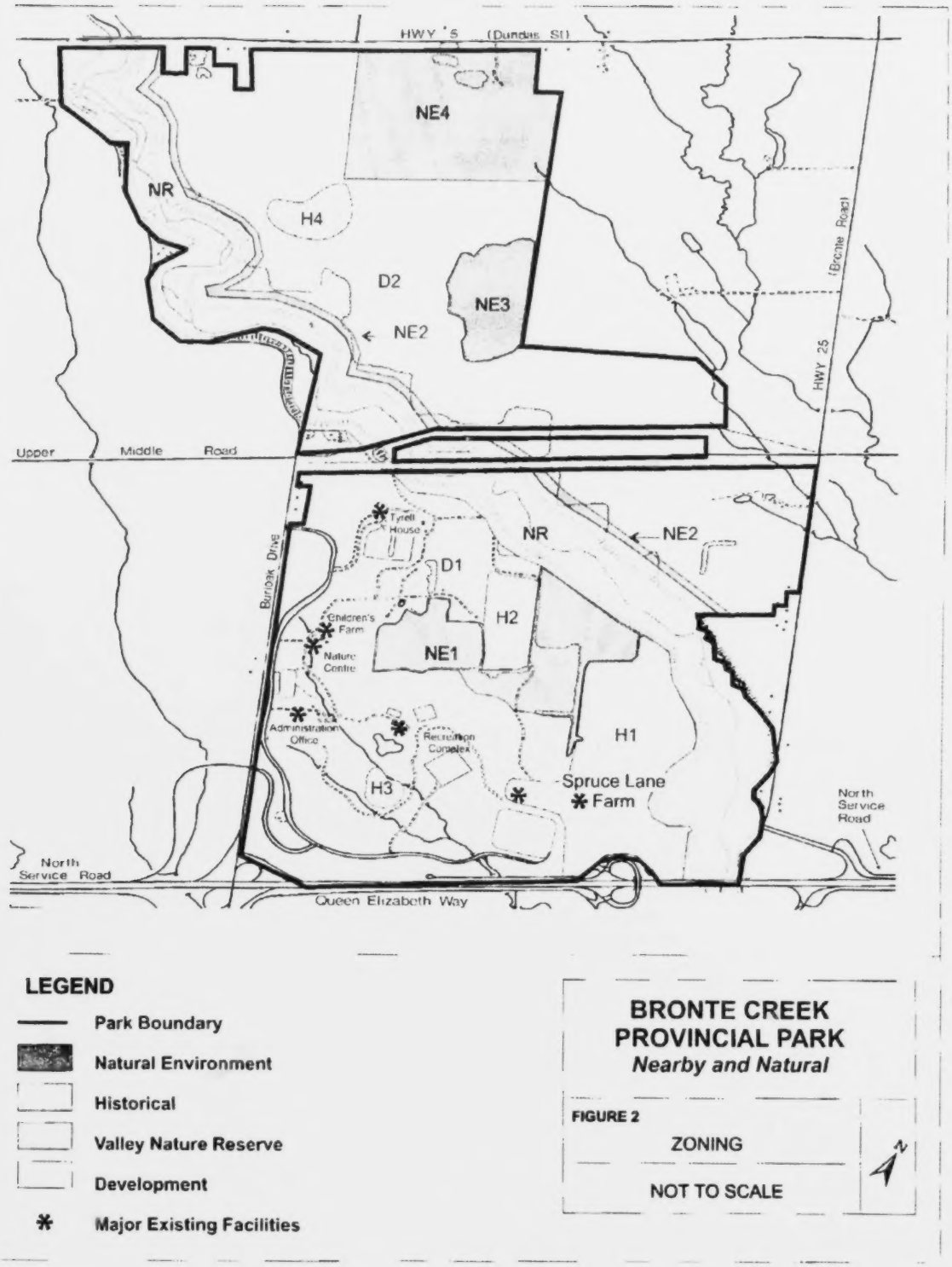

Figure 2: Zoning

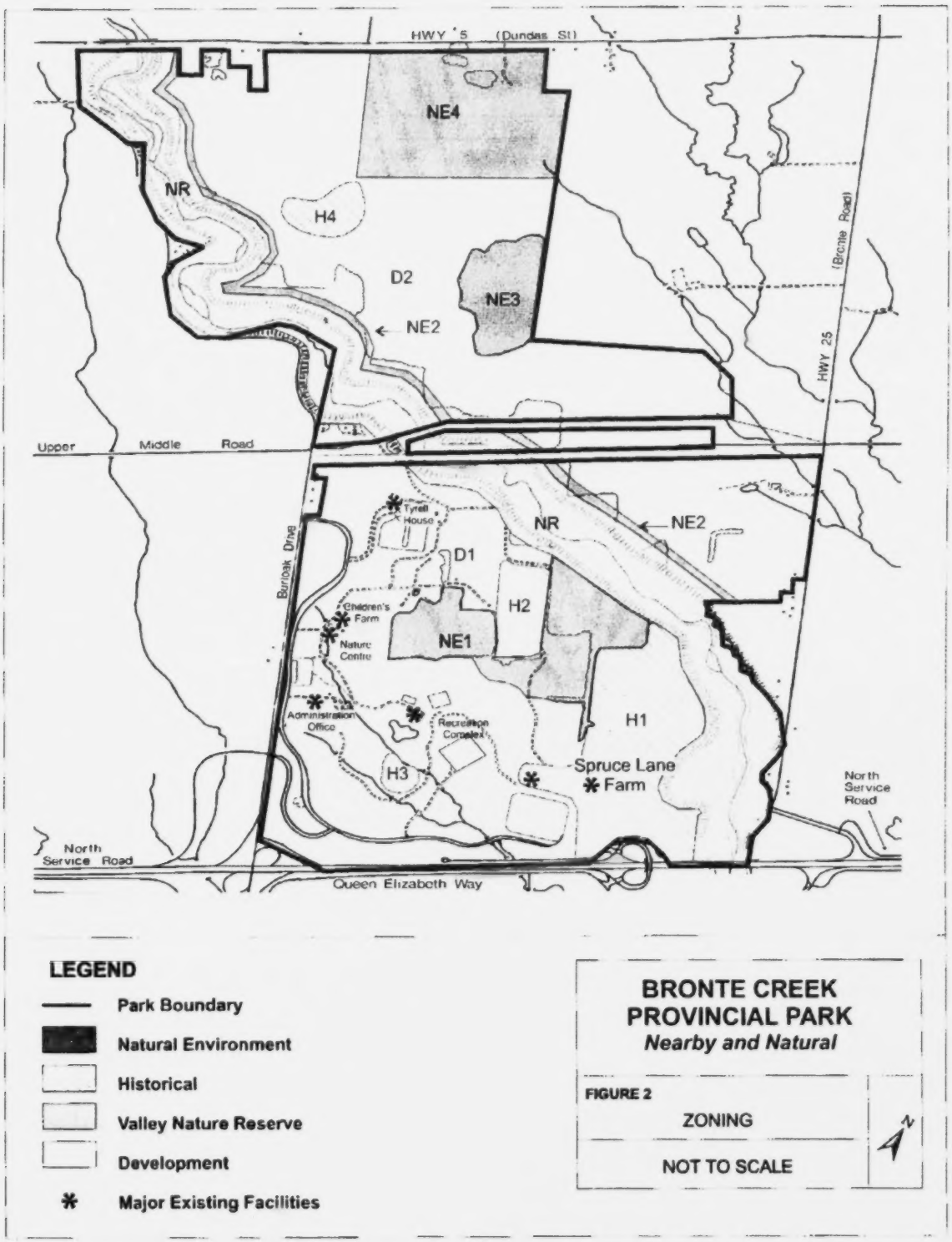

Figure 2: Zoning

The Campground Side

The north section of the park includes the camping facilities and borders the south-facing slope vegetation communities within the Bronte Creek river valley (Figure 2).

This area includes three of the different park management zones (OMNR 1998) (Figure 2):

Development Zone

D2 Gateway: This area is 165 ha in size and consists of the parks campgrounds and farmed areas.

Historical Zone

H4 Dig North: This area is 6.5 ha in size and is a provincially significant archaeological site.

Natural Environment Zones

NE2 Table Lands: This 10 ha area runs the length of the river valley extending 20 m from the edge of the Nature Reserve. It consists of planted trees, abandoned orchards, and abandoned fields.

NE3 Back Country Woodlot: This area is 14.9 ha in size and is an undisturbed oak and hickory woodlot.

NE4 Restoration Area: This area is 47.7 ha in size and is intended "for the purpose of restoration of native species in a natural setting and the scientific monitoring of their health". The land is presently managed for agricultural use (OMNR 1998).

1.2 Policy Framework

This plan was developed to fulfill the vegetation management objectives outlined within the *Bronte Creek Management Plan* (OMNR 1998), summarized here in Table 1.

Table 1. Vegetation Management Strategies (OMNR 1998)

Actions	Nature Reserve Zone	Natural Environment Zones	Development Zones	Historical Zones
Park Level				
Review mowing frequency and area mowed			√	√
Control access to natural areas	√	√		
Maintain trails	√	√	√	√
Re-vegetate areas of bare soil		√	√	√
Use native species for replanting		√	√	√
Reduce use of fertilizers and chemicals		√	√	√
Remove dead or fallen trees that may pose a safety hazard			√	√
Remove diseased vegetation			√	√
Control invasive species (i.e., garlic mustard) and noxious weeds (i.e., poison ivy)		√	√	√
Monitoring				
Monitor any management activities (i.e., plantings, trail closure)	√	√	√	√
Monitor significant species (i.e., population dynamics)	√	√	√	√
Prescribed burning to restore and maintain prairie	√	√		
Erosion Control Strategy				
Evaluate demonstration woodlot program		√		
Encourage vegetated linkages between natural areas for wildlife	√	√	√	√
Tree planting	√	√	√	√

Actions	Nature Reserve Zone	Natural Environment Zones	Development Zones	Historical Zones
Restoration of old fields		√	√	√
Examine feasibility of returning crop fields to natural state		√	√	√
Undertake trail management plan – close and re-vegetate unused, unauthorized trails	√	√	√	√
Assess disturbance of natural and protected areas (i.e., unauthorized trails, structures, cutting for firewood, etc.)	√	√		√
Update Baseline Information				
Update and verify plant communities	√	√		
Update and verify locations of significant species	√	√	√	√
Develop management plan for significant species	√	√		
Develop prairie habitat management plan	√	√		

1.3 Historic Influence on Vegetation Communities

Prior to European settlement virtually all of the area taken in by the park was forested (Goodban 2002). Within the Bronte Creek watershed, the surrounding landscape was predominantly oak, maple, hickory, and pine forests with pine and oak savannahs often being found (Gale 2000). Some sites within the park may also have been occupied by prairie, although specific locations are unknown. The vegetation communities within Bronte Creek Provincial Park have since been greatly influenced by human activities including logging, agriculture and grazing. These activities have included clearing much of the land, creating open fields and fragmented woodlots (House and Carleton 1988). Remnants of these practices can be seen today from the old fields, remnant orchards and woodlots approaching maturity (House and Carleton 1988). Two sawmills operated in the park area in the 1800s and a brick kiln operated in the flood plain on the west side of the river during the 1850's (House and Carleton 1988).

2.0 VEGETATION COMMUNITIES

To assist with the vegetation management planning process a preliminary *Ecological Land Classification* (ELC) for the park has been prepared (Biscaia and Gurr 2006). The classification was developed using a combination of past botanical inventories conducted by House and Carleton (1988), Goodban (2002) and Dougan and Associates (2002); orthophoto interpretation and a site visit conducted in the fall of 2005. It is recommended that a full and complete ELC be completed at a later date to assist with vegetation management in the park.

The ELC classifications used are consistent with Lee *et al.*, (1998) and its updates (Lee 2005). A summary of the ELC communities and descriptions in Bronte Creek Provincial Park is provided in Table 2 and Figure 3.

Bronte Creek Provincial Park is made up of 22 ELC vegetation types in 26 distinct areas (Table 2). The *Life Science Inventory of Bronte Creek Provincial Park* has identified 623 vascular plant species within the park (House and Carleton 1988).

Table 2. Preliminary ELC Vegetation Types in Bronte Creek Provincial Park

ELC Code	ELC Community	Dominant Vegetation
Valley Rim Campground Side and South-Facing Slopes		
FODM5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest Type	Sugar Maple, Red Oak (*Quercus rubra*), White Oak (*Quercus alba*), Hop-hornbeam (*Ostrya virginiana*) and Staghorn Sumac (*Rhus typhina*)
FODM2-4	Dry-Fresh Oak-Hardwood Deciduous Forest Type	Red Oak, White Oak, Hop-hornbeam and Chinquapin Oak (*Quercus muehlenbergii*)
South-Facing Slopes		
FOMM1-1	Dry Chinquapin Oak - Pine Mixed Forest Type	Red Oak, White Oak, Chinquapin Oak and White Pine (*Pinus strobus*)
North-Facing Slopes		
FODM5-1	Dry-Fresh Sugar Maple Deciduous Forest Type	Sugar Maple, American Beech and Black Cherry (*Prunus serotina*)
FOCM3-1	Fresh-Moist Hemlock Coniferous Forest Type	Eastern Hemlock (*Tsuga canadensis*) dominate with Eastern White Cedar (*Thuja occidentalis*), White Birch (*Betula papyrifera*) and Sugar Maple
FOMM6-2	Fresh-Moist Hemlock - Hardwood Mixed Forest Type	Eastern Hemlock and Sugar Maple
Valley Bottom		
FODM7-2	Fresh-Moist Green Ash Hardwood Lowland Deciduous Forest Type	Sugar Maple, Black Maple (*Acer saccharum ssp. Nigrum*), ashes, elms (*Ulmus*) and willows (*Salix*)
Upper West Side		
F0DM5-2	Dry-Fresh Sugar Maple Deciduous Forest Type	Sugar Maple, Butternut (*Juglans cinerea) and* Black Walnut (*Juglans nigra*).
Day Use Side of the Valley		
THDM2-4	Gray Dogwood Deciduous Shrub Thicket	Hawthorns (*Crataegus*), poplars (*Populus*), dogwoods (*Cornus*), New England Aster (*Aster novae-angliae*), Canada Goldenrod (*Solidago canadensis*), Timothy Grass (*Phleum pratense*), St. John's Wort (*Hypericum perforatum*) and Long-leaved Aster (*Aster simplex*)
CUM1-1	Cultural Meadow	New England Aster, Canada Goldenrod, Timothy Grass, St. John's Wort and Long-leaved Asters
FODM5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest Type	Maiden's Blush Trail: Sugar Maple, Red Oak, White Oak, Bur Oak (*Quercus macrocarpa*) and Shagbark Hickory (*Carya ovata*)
FODM5-1	Dry-Fresh Sugar Maple - Beech Deciduous Forest Type	Sugar Maple, American Beech, White Ash (*Fraxinus americana*), Red Oak and Bitternut Hickory (*Carya cordiformis*)
FODM7-3	Fresh-Moist Willow Lowland Deciduous Forest Type	Willows, ash and Basswood (*Tilia americana*)
SAGM2	Old Orchard	Abandoned apple orchard
SAGM1	Vineyards	Abandoned grape vineyard
CGL_4	Recreational Facilities	Picnic shelters, visitors' facilities
CVI_1	Transportation/Parking	N/A

ELC Code	ELC Community	Dominant Vegetation
CVC_1	Park Office	N/A
CVC_2	Maintenance Yard	N/A
OAGM	Open Agriculture	Actively cultivated fields
Campground Side of the Valley		
CUM1-1	Cultural Meadow	Grasses (*Poaceae*), goldenrods (*Solidago*), Rough-fruited Cinquefoils (*Potentilla recta*), asters (*Aster*)
THDM2-4	Gray Dogwood Deciduous Shrub Thicket Type	Gray Dogwood (*Cornus racemosa)*, Hawthorn, ash, poplar and oak
FODM2-2	Dry-Fresh Oak - Hickory Deciduous Forest Type	Red Oak, White Oak and Shagbark Hickory (*Carya ovata*)
MEGM1-2	Dry Big Bluestem Graminoid Tallgrass Prairie Type	Upper Middle Road Allowance: Big Bluestem (*Andropogon gerardii*), Chinquapin Oak, Wandlike Bush Clover (*Lespedeza intermedia*) and Hairy Bush Clover (*Lespedeza hira*). Burlington Hydro Right of Way: Big Bluestem, oaks and shrubby species
WOCM1-2	Dry-Fresh White Cedar Coniferous Woodland Type	Valley Slope: Eastern White Cedar, Big Bluestem, Butterfly Weed (*Asclepias tuberosa*), and Chinquapin Oak
WOMM3-20	Dry-Fresh Oak - White Cedar Mixed Woodland Type	Valley Rim: White Oak, Eastern White Cedar, Chinquapin Oak, Big Bluestem, Hairy Bush Clover and Wrinkled-seeded Sedge (*Carex rugosperma*)

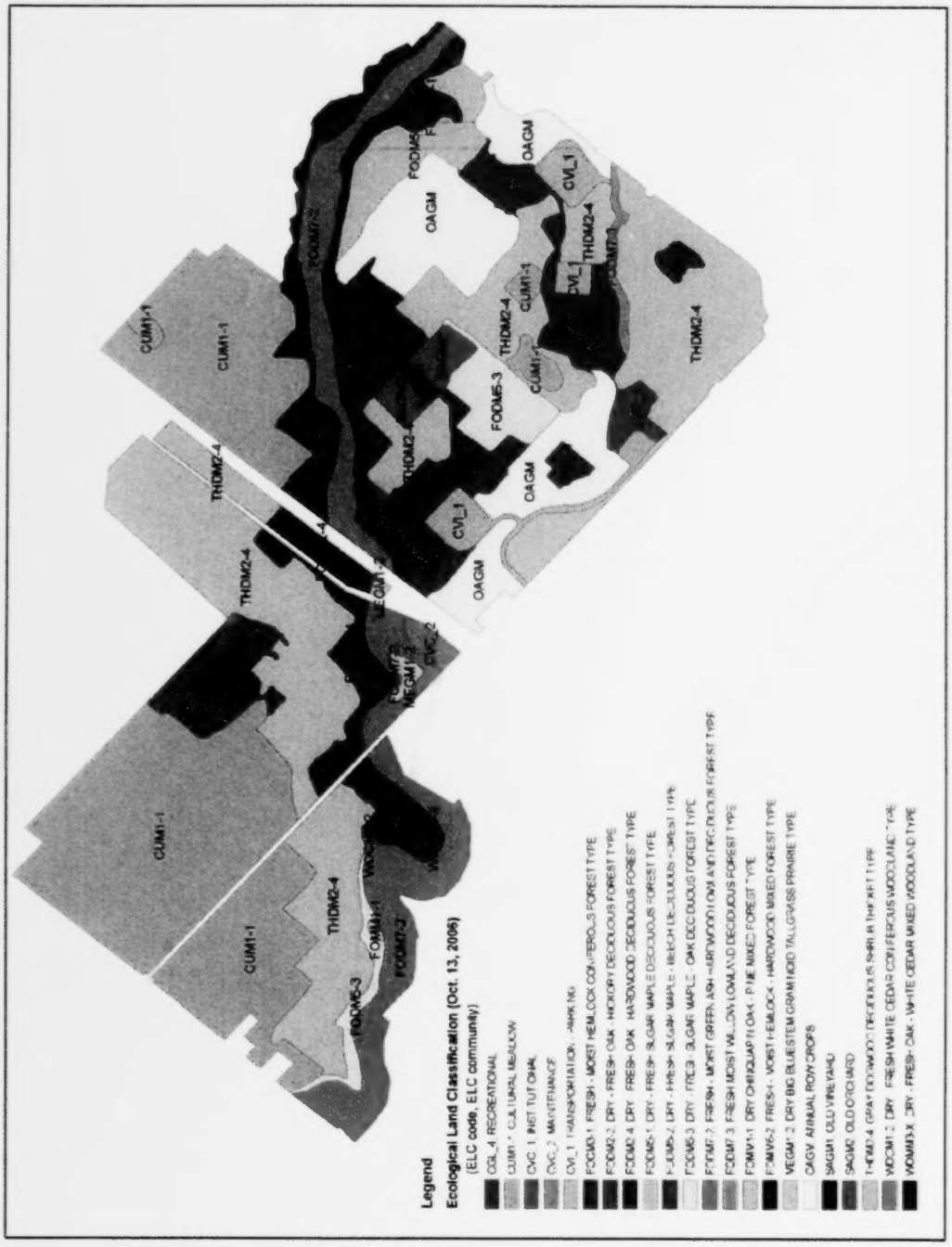

Figure 3: Vegetation Communities

Figure 3: Vegetation Communities

FODM2-4
FODM2-4
FODM7-2
FODM6-2
FODM5-2
SAGM2
SAGM1
SAGM2
CGL_4
CGL_4
CGL_4
CVC_1
CGL_4

3.0 GOAL AND OBJECTIVES

3.1 Goal

The goal of the *Bronte Creek Provincial Park Vegetation Management Plan* is to:

Provide direction on vegetation management issues within Bronte Creek Provincial Park to promote the persistence of naturally occurring vegetation communities within the park and the natural processes that occur within them; to convert some agricultural areas of the park to appropriate natural habitats and to provide opportunities for the public to engage in compatible recreational activities, consistent with the park management plan.

3.2 Objectives

The objectives of the *Bronte Creek Provincial Park Vegetation Management Plan* are to:

- Conserve and, where necessary, restore viable populations of indigenous plant species, with an emphasis on protecting species at risk and their respective habitats within the park;
- Eliminate or reduce the threat of invasive exotic species;
- Restore or convert some agricultural fields to regionally appropriate natural habitats such as grassland or forest;
- Ensure that ongoing farming activities within the park are done in the most ecologically sound manner possible;
- Provide opportunities to enhance park visitors' experience by planting native species in recreation areas;
- Provide opportunities for park visitors to appreciate and learn from the diverse vegetation communities of the park, in ways that do not threaten existing natural values; and
- Reduce park visitor safety hazards associated with vegetation.

4.0 MANAGEMENT UNITS AND PRESCRIPTIONS

The *Bronte Creek Management Plan* outlines general vegetation management policies (See Section 1.2) which have provided the basis for the more detailed management prescriptions outlined here, based on vegetation management issues and vegetation communities found throughout the park.

Section 4.1 will provide further direction for general management prescriptions that may be implemented throughout the entire park, whereas section 4.2 will provide specific management prescriptions that may only be implemented within specific vegetation management units.

Site conditions prior to the implementation of species and habitat specific management prescriptions should be well documented (e.g., presence of invasive species or species at risk) (Appendix 1). General management prescriptions carried out as part of regular park maintenance such as lawn mowing and dead and hazardous tree removal do not require the same documentation. An adaptive management approach will be taken when implementing vegetation management prescriptions to allow for modifications as necessary to ensure success.

4.1 General Management Prescriptions

The following general management prescriptions apply to all vegetation management units within the park.

4.1.1 Dead and Hazardous Trees

Safety will be the largest factor in decisions for hazardous tree removal, however, the importance of dead tree material and downed woody debris must also be considered. Dead trees will be left standing as wildlife habitat for cavity-nesting birds and mammals in all zones at the superintendents discretion, except in instances where they pose a direct threat to public safety and with the exception of situations where their presence:

- Obstructs efforts to maintain campsites and trails;
- Results in park visitors scavenging wood for camp fires;
- Encourages insect infestations that may be detrimental to the health of the forests.

Material that has been removed from a site can be used as firewood or could be chipped and used to help reduce erosion and build up an organic layer in newly developed areas. It may also be moved to a central composting site in the park or moved into old field habitats or day use areas that have been retired from mowing and that are being allowed to regenerate.

Further guidance on the treatment of dead and hazardous trees is found in Appendix 2.

4.1.2 Herbicide Use

The *Bronte Creek Management Plan* discusses reducing the use of fertilizers and chemicals in the natural environment, development and historical zones, however, herbicides that biodegrade quickly, have low soil activity and have been tested and been shown to have minimal environmental impacts (e.g., glyphosate and triclopyr) (OMNR 2001) can be used for restoration activities and the control of invasive species. Use of herbicides for restoration activities and controlling invasive species represents an exceptional circumstance and as such, herbicide may be used in all areas of the park as determined through consultation with the zone ecologist for these purposes. See Section 5.0 for further information on the control of invasive species.

Any person working with herbicides in the park must do so under the requirements of the *Pesticides Act* and Ontario Parks policy PM 2.16 (Use of Pesticides and Herbicides in Provincial Parks).

Species such as Poison Ivy (*Rhus radicans*) may be controlled as deemed necessary in the development zone and in some instances in the natural environment and historical zones in areas where park visitors may come

into direct contact with the plant (i.e., trails). Glyphosate is currently the best control for Poison Ivy (OMNR 2001).

4.1.3 Forest Fire Management

Studies of the historical role of fire in this region are limited. Though fire did occur occasionally, it was much less common than in other forest regions (Van Sleeuwen 2006). Fires also help to reduce fuel loads, decreasing the likelihood of large intense fires that are difficult to control (OMNR 2005[a]).

Forest fire management involves the protection of values and the attainment of resource stewardship objectives through two main approaches:

- Fire response: The protection of people, property, and natural areas from wildfire; and,
- Fire use: The strategy of maintaining fire as an ecological process or meeting resource management objectives through the application or management of fire.

The Forest Fire Management Strategy for Ontario (OMNR 2004) provides strategic direction for the management of wildfire across Ontario. Bronte Creek Provincial Park is located in the Southern Ontario Zone according to this provincial strategy. Within this zone, municipalities are responsible for providing fire response for all forest fires to protect life, property and infrastructure in accordance with the *Fire Protection and Prevention Act* (FPPA).

Fire management objectives within Bronte Creek Provincial Park will focus on the prevention of personal injury, value loss, and social disruption; and in helping to restore and maintain ecological integrity.

In particular, fire management will help to:

- Perpetuate naturally occurring vegetation communities and their underlying ecological processes;
- Enhance habitat for fire depended flora;
- Reduce fire hazards, including accumulations of biomass that function as fuels;
- Restore the naturalness of the environment through reintroducing fire as a natural processes;
- Provide opportunities for protected area visitors to appreciate and learn about the natural role of fire.

To provide detailed direction on achieving these fire management objectives, the Park will commit to writing a Statement of Fire Intent as directed by *Fire management policy for Provincial Parks and Conservation Reserves.* This statement will consider and document the role of fire in Bronte Creek Provincial Park, scoping fire management objectives and opportunities. This statement will be developed in consultation between the Park Superintendent and MNR fire management personnel.

Fire Response

Given the size of the park and adjacent developed areas, unplanned fires could pose a threat to public health and safety, property and infrastructure. Therefore all forest fires will receive a full response and sustained action. Bronte Creek Provincial Park is within the town of Oakville and fire protection services are provided to the park by the town.

"Light on the land" fire suppression techniques will be used whenever feasible. These minimal impact suppression techniques do not unduly disturb natural or cultural values. Examples may include limiting the use of heavy equipment or the felling of trees during fire response.

Fire evacuation procedures will be as outlined in the Emergency and Evacuation Plans for Bronte Creek Provincial Park.

Fire Use

MNR recognizes fire as an essential ecosystem process, fundamental to restoring and maintaining the ecological integrity of certain ecosystems. Fire use for ecological and vegetation management objectives in the park will be achieved by exploring opportunities for prescribed burning. Prescribed burning refers to the deliberate, planned and knowledgeable application of fire by authorized personnel to a specific land area to accomplish pre-determined objectives.

- Prescribed burning may be used to achieve ecological or hazard reduction objectives;
- Plans for any prescribed burning will be developed in accordance with the MNR Prescribed Burn Policy, its associated planning manual, and the Class Environmental Assessment for Provincial Parks and Conservation Reserves, in cooperation with Aviation and Forest Fire Management.

4.1.4 Forest Insects and Diseases

Non-native forest insects and diseases will be examined periodically for outbreaks that may pose a threat to forest health or other park values. Control of non-native forest insects and disease will be examined on a case-by-case basis and decisions will be carried out in consultation with the zone ecologist and OMNR forestry and entomology staff. Biological controls, such as *Bacillus thuringiensis* (Bt) will be used whenever feasible to control insect outbreaks.

4.1.5 Landscape Planting

Species native to the park should be used for landscape planting (See House and Carleton 1988). If commercial seed mixes are used to re-vegetate disturbed areas (i.e., roadsides, campgrounds and day use areas), seed mix should be used which contains as many species native to the park as possible.

Where possible, plant stock obtained from outside the park for landscape planting and restoration should be from a local seed source to ensure that they are of a similar genotype and adapted to local growing conditions. Plant stock derived from park seed may be the preferred option in many cases (see section 4.1.9).

4.1.6 Grass Mowing

Lawns will be mown in the development and historical zones (OMNR 1998) where appropriate to maintain park buildings, recreational areas, roadways, campgrounds and farms. The extent of area to be mowed may vary with park usage and resources. Areas left to regenerate will be monitored for the colonization of invasive species and further management actions, i.e., annual mowing, may occur to control them as necessary.

4.1.7 Campgrounds / Trails

Vegetation in the park campgrounds and trails will require general upkeep, including the removal of dead and hazardous trees, control of Poison Ivy and lawn mowing. These activities are permitted as per Sections 4.1.1, 4.1.2 and 4.1.6 of this plan.

4.1.8 Transplanting

Where existing vegetation may be lost due to development, plants may be salvaged and transplanted for naturalization and restoration purposes within the park. Transplanting vegetation outside the park will be examined on a case-by-case basis and only be appropriate once park needs have been met. Preference would be given to local naturalization and restoration projects near the park.

4.1.9 Seed Collecting

Seed Collecting for Use Within the Park

Seed may be collected for use in propagation and planting within the park for restoration and naturalization purposes. Harvesting effort will be rotated and spread throughout the park. The amount of seed collected will be limited based on the species, and determined in consultation with the zone ecologist. Records will be kept regarding:

- The species and amount of seed harvested;
- The location of harvesting;
- The date of harvesting;
- The destination of seed collected.

Seed collecting for Use Outside the Park

Seed collection for use outside the park will be based on the following guidelines until such time that Ontario Parks develops and approves a seed collection policy. Seed collection for use outside the park will be examined on a case-by-case basis in consultation with the zone ecologist and under the authority of the park superintendent. Seed collection should be for local conservation purposes only, and not for private use (i.e., private gardens) or commercial purposes (i.e., nursery stock) unless done under a partnership agreement with the park whereby the grower is propagating plant species for the park and selling a negotiated proportion of the grown stock to recover costs. Agreements for seed collecting for use outside of the park will be authorized through a memorandum of understanding or a completed *Application to Harvest Seed in Provincial Parks* until such time as a specific seed collection policy is implemented. The superintendent will have final discretion on such authorizations. Approval will be based on the following considerations, guidelines and conditions:

- Where the seed will be used;
- The amount of seed required;
- Availability of seed sources outside the park;
- The harvesting method used.

The location and amount of seed harvested will be determined by park staff and the zone ecologist. The park reserves the right to request a portion of the seed for park use and the park superintendent reserves the right to cancel harvesting agreements at any time.

4.1.10 Public Gardens

Species that may threaten park values should not be planted in the public gardens. Plants grown in the public gardens should be limited to annuals and garden vegetables.

4.2 Vegetation Management Units and Prescriptions

Bronte Creek Provincial Park has been divided into vegetation management units, to facilitate the development of vegetation management prescriptions (Figure 4). Vegetation management units are defined by vegetation communities (ELC classifications), property boundaries, roads and existing trail systems within the park. The vegetation communities defined in Section 3 provide descriptions of the values for which the vegetation management units have been developed, to be consistent with the parks management plan.

4.2.1 The Valley

Vegetation Management Unit A: The Valley

Vegetation management unit A includes portions of vegetation communities FODM5-3, FODM2-4, FOMM1-1, FODM5-1, FOCM3-1, FOMM6-2 and FODM7-2 (Figure 4). This area takes in the length of the river valley including the valley bottom, slopes and table lands. It encompasses the entire valley NR (nature reserve), and all or part of natural environment zones NE2 (Table Lands) and NE1 (Maple Sugar Woodlot) (OMNR 1998).

The objective for vegetation management Unit A (The Valley) is to allow natural processes to take place and to protect the river valley corridor by pursuing the following targets:

- Protect nature reserve boundary (at the edge of the ANSI, tree line or 40 m from crest of the valley, whichever is greatest) (OMNR 1998);
- Protect earth and life science values found within the valley (e.g., Carolinian and prairie species).

Active management of the vegetation within the river valley is not anticipated at this time as there is minimal human impact, however, vegetation management prescriptions will be implemented and evaluated on a case-by-case basis as required in consultation with the zone ecologist. Park users should be encouraged to stay on established trails using signage, the park tabloid and enforcement, emphasizing the importance of this area to the park as a linkage between Lake Ontario and the Niagara Escarpment.

4.2.2 The Park Boundary

Vegetation Management Unit B

The Park Boundary

Vegetation management unit B is defined by the park borders of Dundas Street (Hwy. 5) to the north, Burloak Drive to the west, Bronte Road to the east and the Queen Elizabeth Way to the south (Figure 4). It is largely composed of vegetation community THDM2-4.

The objective of vegetation management unit B (The Park Boundary) is to enhance the experience of park visitors by providing a visual and noise barrier from outside park influences (OMNR 1978), by pursuing the following targets:

- Plant native tree species along the park border that reduce outward view and help reduce noise (OMNR 1978);
- Where possible establish a visual buffer of approximately 30 m along the park border;
- Improve the aesthetics of views from the park's interior (OMNR 1978).

Burloak Drive

The day use side of the park borders Burloak Drive with extensive views of industrial and commercial buildings. The main interior access road parallels Burloak Drive very closely, separated from it by a berm.

Because of the proximity of the road's location to Burloak Drive, it may not be possible to establish a 30 m buffer along this park border. As an alternative, trees and shrubs will be planted along parking lot berms to increase the effectiveness of these buffers. Views of outside urban development in this area can be minimized by:

- Planting a high density Eastern White Cedar buffer in areas where the two roads parallel each other;
- Planting a medium-to low-density buffer on the berm between parking lot C and the road, consisting of White Pine and Eastern White Cedar;

- Planting a medium-to low-density buffer past parking lot C, consisting of Eastern White Cedar, oaks and low lying-shrubs (Appendix 3: Buffer planting guidelines).

Eastern White Cedar and low lying-shrubs such as dogwoods and Staghorn Sumac are good candidates for planting in this area. Cedar should be used in sections where the park road and Burloak Drive are very close and in low-lying areas between the berm and the interior park road where drainage is poor. Along the interior park access road, the height of the berm begins to increase southward past Parking Lot C approaching the Queen Elizabeth Way. White Pine and Red Oak are well established in this area and further planting of these two species will reduce the outward view and noise coming into the park.

Median

Planting shrubs and native prairie grasses such as Big Bluestem on the median of the park access road will enhance this buffer further. Planting should be well spaced and backed away from parking lot entrances to ensure a good line of sight for oncoming traffic. Because the primary high voltage power line is directly beneath the median, deep rooted species should not be planted (D. Boddington, personal communication 2006).

Queen Elizabeth Way (QEW)

Driving along the QEW, the park border is evident from the presence of a large sign on top of the berm. For many people this sign is the only indication of the parks presence.

In addition to protecting outward views and reducing noise in the park, planting selected species on the berm may improve people's perception of the park as a natural recreation area and provide some contrast to the surrounding developed landscape. This would visually promote "The Gateway" and "The Oasis" visions of the park (OMNR 1998). The above can be accomplished by:

Developing new park signage combined with native species landscaping including:

- Planting of species such as Staghorn Sumac around the existing park sign, providing the area with colour and contrast to the surrounding landscape year-round (OMNR 1978);
- Planting a medium-to low-density conifer buffer (White Pine / Eastern White Cedar) east towards the river valley;
- Allowing for natural succession to occur along the border of cultural thickets and agricultural fields to further enhance this buffer.

Deciduous trees that would be appropriate for planting include Sugar Maple, White Birch, White Oak, Red Oak, and Black Cherry as this boundary is adjacent to the upland mixed forest found on the west side of the southern portion of the river valley (House and Carleton 1988).

Bronte Road

Bronte Road parallels the eastern portion of the park boundary. The south-eastern corner of this boundary is forested (House and Carleton 1988). Moving north along the boundary there is a cultural meadow approaching the campground office, and a housing subdivision development can be seen from the leash-free zone. A portion of the campground side of this park boundary is an upland oak / Shagbark Hickory forest (House and Carleton, 1988), and the remainder is bordered by cultural meadows and thickets adjacent to a housing subdivision development. The outward park view can be managed by the following methods:

- Planting low-to medium-density conifer buffers with Eastern White Cedar and shrubs such as dogwoods;
- Adjacent to grassland creation areas (See Section 4.2.4.2) species may include oaks, hawthorns and hazels (M. Gartshore, personal communication 2006);
- Promoting natural succession along buffers consistent with adjacent forest types.

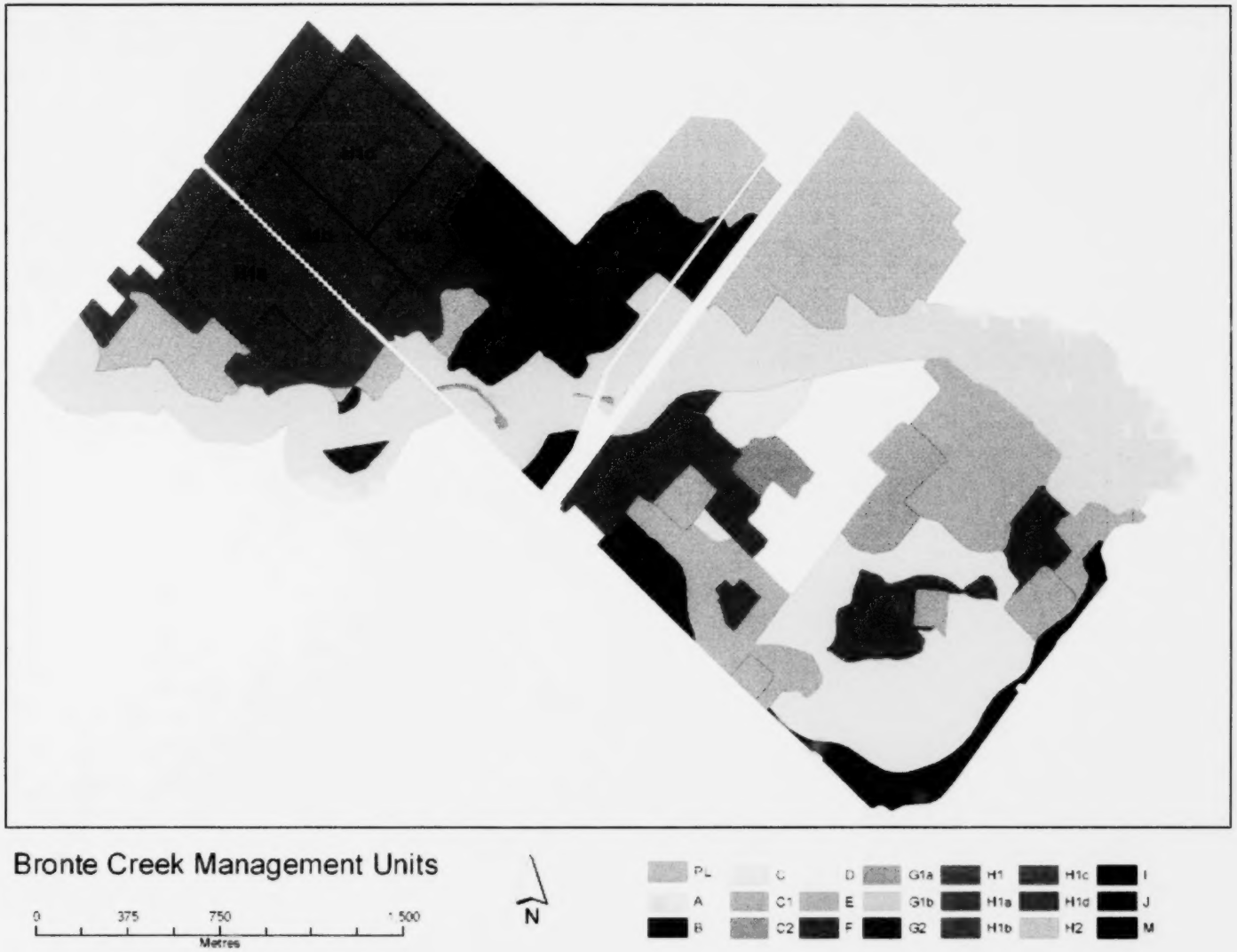

Figure 4: Vegetation Management Units

Figure 4: Vegetation Management Units

Dundas Street

Much of the Dundas Street park boundary faces a protected "Green Belt" to the north and is less developed than the other park boundaries. Although it is less developed, visitors are still subjected to road noise and the visual impact of Dundas Street. The visual impact of Dundas Street can be managed by the following methods:

- Planting a medium-to low-density buffer (Eastern White Cedar, Sassafras, dogwoods, and Staghorn Sumac) along this border;
- Adjacent to grassland creation areas (See Section 4.2.4.2) species may include oaks, hawthorns and hazels (M. Gartshore, Pers. Comm.);
- Utilizing natural succession and regeneration to further enhance the buffer.

4.2.3 Day Use Area

Vegetation Management Unit C

Cultural Thickets and Meadows

Vegetation management unit C is primarily defined by vegetation communities THDM2-4, CUM1-1 and FODM7-3 (Figure 4). This management unit makes up a large portion of the day use area and is included in the parks D1 (Oasis: development zone) and H3 (Dig South: historical zone) (OMNR 1998).

The objectives of vegetation management unit C are to:

- Improve the recreational potential of the day use area;
- Recognize the contribution of cultural thickets and meadows to the natural values of the park (Geomatics International Inc. 1995);
- Promote natural succession;
- Plant trees to provide linkages and connectivity between existing woodlands (OMNR 1999[a]).

This can be accomplished by pursuing the following targets:

- Enhance recreational opportunities and experiences through under-planting in high recreational use areas (e.g., leash-free zones);
- Use fencing to protect newly planted areas from trampling until vegetation becomes established;
- Promote succession in cultural thickets and plantations south of heritage orchards to increase connectivity between Burkholder's Woods (FODM5-3) and Logging Trail Woods (FODM5-1);
- Allow natural succession to continue in the milkweed field (located to the north of the Grey Picnic Shelter) for activities such as birding and butterfly watching.

Cultural Meadows / Thickets (Day Use Area)

Recreational opportunities and experiences can be improved and enhanced through selective planting of trees in the cultural meadows and thickets in the southern portion of D1 (Oasis: development zone), surrounding the recreation complex and leash-free areas. Selective planting can serve to enhance the area aesthetically, provide shade and define areas within the park (OMNR 1978).

Prior to European settlement within the Bronte Creek watershed, the surrounding landscape was predominantly oak, maple, hickory, and pine forests with pine and oak savannahs often being found (Gale 2000). These species and communities are native and should be given strong consideration for restoration planning.

Lombardy Poplar

Lombardy Poplar (*Populus nigra L. cv. Italica*), a cultivar from Europe, has been planted throughout much of the park. These areas are excellent candidates for under-planting with native species such as oak, maple, hickory and pine as the Lombardy Poplars are reaching the end of their life span (D. Boddington, personal

communication 2006). Once trees in under-planted areas are established, Lombardy Poplar can be cut down as they are not native to Canada.

Woodland Linkages (C1)

Connectivity and linkages should be established between the cultural meadows, thickets, and conifer plantations separating Burkholder's Woods (FODM5-3) and Logging Trail Woods (FODM5-2) to reduce the amount of habitat fragmentation within the park and increase forested area (Figure 4) (OMNR 2000[b]).

Expansion of neighbouring forest can be promoted by allowing for natural regeneration and succession in thickets, meadows, and plantations surrounding these two woodlots. Succession can be assisted by planting trees (OMNR n.d.). Planting should be focused around openings and edges of woodlands and in conifer plantations. Species selected for planting should be representative of the two adjacent woodlots. As areas planted with conifers mature, thinning may be required to return them to a mixed-wood state (OMNR n.d.). Pre-settlement mixed-wood forests had a significant pine component that should be retained (OMNR 2000[a]).

In areas with heavy thatch and ground cover, site preparation may aid in reducing competition and rodent damage and increase survival of planted trees (OMNR 1995[a]).

Milkweed Field (C2)

The Milkweed field north of Burkholder's Woods should be left to natural succession processes since the field provides recreational opportunities for park visitors in the forms of butterfly and bird watching and contributes to the park's biodiversity (Figure 4).

Vegetation Management Unit D

Woodlots and Heritage Orchards

Vegetation management unit D is defined by vegetation communities FODM5-3, FODM5-2, SAGM2 (heritage orchards), and SAGM1 (vineyards) (Figure 4). This vegetation management unit takes in the Maiden's Blush and Logging trails and is included in the NE1 (Maple Sugar Woodlot: natural environment zone) (OMNR 1998).

Burkholder's Woods (FODM5-3) and Logging Trail Woods (FODM5-2) should be left to natural processes. Expansion of these forested communities into adjacent fields and thickets should be promoted (See Vegetation Management Unit C). Allowing for natural succession to continue without human intervention will promote retention of features such as snags, cavity trees, organic and downed woody debris, canopy gaps, conifers, super-canopy trees and mast-producing trees (OMNR n.d.[a], OMNR 2000[a], OMNR 1999[a]). Park users should be encouraged to stay on established trails, using signage, the park tabloid and enforcement (OMNR n.d.[a]).

These woodlots are bordered by orchards that make up part of the parks historical zone (OMNR 1998). The orchards are overgrown and many of the fruit trees have been overtaken by vines. The orchards can be left to regenerate naturally, serving as relics of historical land use practices in the park's H2 (Heritage Orchard: historical zone).

Vegetation Management Unit E

Farms

Vegetation management unit E is defined by vegetation community OAGM and H1 (Spruce Lane Farm: historical zones) (Figure 4) and includes fence rows and orchards within those zones (OMNR 1998).

Crop farming will continue to be part of Bronte Creek Provincial Park operations on the day use side with the following modifications:

- No removal of fence rows;

- Back cultivation / mowing away from existing fence rows (approximately 7 m on either side where possible) (IDNR 2004) to promote better wildlife corridors and improved linkages to other habitat (OMNR 1994);
- Employ environmentally appropriate farm practices where possible (i.e., no-till and planting species that will not naturalize);
- Apply herbicides and pesticides appropriately to reduce drift out of agricultural areas;
- Grow late maturing grasses such as Timothy (Undersander *et al.* 1996);
- Implement a delayed cutting regime (1st week in July or later) to increase grassland bird nesting success in hay fields (Nocera *et al.* 2005).

Vegetation Management Unit F

Recreational Facilities

Vegetation management unit F is defined by vegetation community CGL_4 (Figure 4). This area includes the recreational facilities that the park has to offer and is included within development zone D1 (Oasis: development zone) (OMNR 1998).

There are no prescribed changes to the maintenance of recreational facilities (i.e., mowing) as a result of this vegetation management plan. Where grass cutting immediately borders a tree line, mowing could be reduced to allow for natural regeneration. The amount of area mowed within the development zone may change over time, depending on the level and nature of park use. When conducting maintenance activities in the development zone, consideration should be given to the Nature Reserve designation of the adjacent valley (OMNR 1998).

4.2.4 Campground Area

Vegetation Management Unit G

Prairie Elements

Vegetation management unit G is defined by areas primarily within vegetation communities MEGM1-2, WOCM1-2 and WOMM3-20 (Figure 4). These areas are located along the valley rim, road allowances and hydro transmission corridors and are included in natural environment zone NE2 (Table Lands: natural environment zone) (OMNR 1998).

The objective of vegetation management unit G is to maintain, rehabilitate / restore and expand where appropriate tallgrass and woodland prairie elements by meeting the following targets:

- Protect existing tallgrass and tallgrass woodland prairie remnants (Rodger 1998);
- Maintain, enhance and increase tallgrass prairie on appropriate sites (Dougan and Associates 2002);
- Maintain, enhance and increase tallgrass woodland on appropriate sites (Dougan and Associates 2002);
- Preserve species at risk (SAR) habitat and features associated with tallgrass and tallgrass woodland prairie (Dougan and Associates 2002);
- Develop a prescribed burn and mowing program for prairie communities (Dougan and Associates 2002);
- Implement woody vegetation and invasive species control to reduce competition (Dougan and Associates 2002).

Active management is required to conserve native prairie elements in Bronte Creek Provincial Park and to prevent succession from overtaking them. Both tallgrass prairie and tallgrass woodland sites are experiencing regeneration of woody species because of a lack of natural disturbance to maintain their open nature (Dougan and Associates 2002). Without intervention (burns, woody species control, and/or mowing), these habitats will not persist (Goodban 2002, Dougan and Associates 2002). Because the native prairie elements within the park are located close to the valley rim and away from the tablelands that are associated with fire sensitive SAR, they are excellent candidates for prescribed burn and mowing programs (Goodban 2002, Geomatics International Inc. 1995).

Comprehensive grassland studies (Goodban 2002) and vegetation management plans for SAR habitat (Dougan and Associates 2002) have been developed with the intent of being integrated within this plan (Dougan and Associates 2002). Suggested tallgrass prairie and tallgrass woodland restoration and creation sites can be seen in Figure 4.

As some of the prairie elements are on land owned by other agencies (i.e., road allowances and hydro transmission corridors), the appropriate agencies will be contacted before initiating prairie enhancement / creation prescriptions.

Tallgrass Prairie Elements (G1)

There are two main tallgrass prairie communities (MEGM1-2) within Bronte Creek Provincial Park. Suggested prairie restoration areas can be seen in Figure 4. Goals for this vegetation management unit are:

- Remove woody vegetation cover, retaining healthy specimen trees > 45 cm in diameter. Retain desirable woody species such as oak spp., *Vaccinium* spp., etc. (Dougan and Associates 2002);
- Maintain less than 15% canopy cover of woody vegetation throughout this zone (Dougan and Associates 2002).

Tallgrass Woodland Prairies (G2)

Tallgrass woodlands (WOCM1-2 and WOMM3-20) are located along the valley rim of the park. Areas suggested for restoration can be seen in Figure 4. Goals for this vegetation management unit are:

- Remove excess or undesirable woody vegetation cover through a thinning program. Target shade-tolerant trees and shrubs (e.g., ash spp., maple spp., Round-leaved Dogwood, buckthorn spp. etc.) (Dougan and Associates 2002);
- Remove fuel wood and brush (Dougan and Associates 2002);
- Retain healthy specimen trees > 45 cm in diameter, particularly oak spp., including White Oak, as well as Shagbark Hickory (Dougan and Associates 2002);
- Leave trees on valley edge to maintain slope stability and prevent erosion;
- Maintain canopy at less than 60% throughout this zone (Dougan and Associates 2002).

Vegetation Management Unit H

Cultural Meadows / Thickets and Farm Fields (H1)

Vegetation management unit H is defined by vegetation communities CUM1-1 and THDM2-4 (Figure 4). This area is located on the east side of Bronte Creek and is included in D2 (Gateway: development zone), NE (restoration area: natural environment zone) and H4 (Dig North: historical zone) (OMNR 1998).

The objective of vegetation management unit H is to manage Bronte Creek Provincial Park's cultural meadows, thickets and farm fields north of the river valley in a manner that:

- Conserves and enhances old field habitat occupied by grassland bird species, including species at risk, in the short and mid terms (Dougan and Associates 2002);
- Recognizes the value of old field and grassland habitats in Bronte Creek Provincial Park, as an intermediate stage in woodland recovery (Geomatics International Inc. 1995);
- Converts active agricultural fields to tallgrass prairie and ultimately to woodland and forest habitats;
- Promotes natural succession and widening of forested valley tableland south of the campground office (See H2, Figure 4);
- Increases the amount of forest along the valley rim in the north section of the park (See H2, Figure 4) (Goodban 2002);
- Promotes linkages between the Back Country Woodlot and the valley forests (See H2, Figure 4) (Goodban 2002).

Large portions of this vegetation management unit are classified as cultural meadows and thickets (old field) from which there are records of uncommon grassland bird species, including at least one provincially

endangered species using these habitats (Goodban 2002, Coady 2007). These surrogate grasslands provide opportunities to contribute to species recovery planning through temporary enhancement and/or expansion of these communities (Austen *et al.* 1997). Management prescriptions must be carried out with caution and consideration given to timing of activities because of the sensitivity of the species (See SAR Section 6.0).

Although the tableland areas of the park would not have been prairie historically, there are historical records of prairie communities in the Bronte Creek area (W. Bakowsky, personal communication 2006) and remnant prairies exist within the park. In the long term, restoration of retired fields to the previously existing forested habitat is the goal. However, restoring large blocks of forest in urban and rural environments takes a long time and can be quite difficult and expensive due to the constant influx of non-native species and the active management that would be required. In the interim (short- to medium-term), the creation of grasslands in the retired agricultural fields is an appropriate objective, until such time as the methods and resources are available to continue the restoration process towards woodland and forest habitat.

The above objectives can be met by pursuing the following targets:

- Maintain and enhance existing surrogate grassland habitat for SAR (Dougan and Associates 2002);
- Plant warm season grassland on newly retired agricultural fields (Dougan and Associates 2002);
- Promote natural succession and/or actively encourage forest regeneration to enlarge existing woodlots.

The greatest difficulty with grassland restoration is the control of undesirable herbaceous plants including non-native grasses. In order to reduce competition from these undesirable species, the best approach is to convert existing agricultural fields into a crop of Roundup Ready soybeans or corn prior to beginning native grassland restoration (M. Gartshore, personal communication 2006). Once the crop has been harvested, native grassland restoration can begin by planting a blend of Big Bluestem, Little Bluestem, and Indian Grass, using the following method (M. Gartshore, personal communication 2006):

- In the spring after harvest, begin native grass planting by mid-May or earlier;
- Wash all equipment and machinery before bringing it into restoration fields to prevent the introduction of invasive species.
- Seed with a DU Traux no till flex drill with a hopper for fluffy seeds. Use small amounts of seed and stop to clean the cups frequently;
- Roller-pack the soil after the seeding is finished;
- Spray weeds with 2-4D two months after seeding;
- Mow in early August if necessary to prevent weeds from going to seed;
- Control weeds by burning in early spring, beginning in the third year in sections less than 30 ha in size. Spray cool season grasses with glyphosate before warm season grasses emerge (April 25) (Environment Canada 2006).

Approximately 149 ha of agricultural fields are proposed for grassland creation. It is expected that restoration will take several years, with new portions being added each year. All fields will be planted in Roundup Ready soybean (or corn) beginning as early as 2007, with grassland planting beginning in some fields as early as 2008. Figure 5 identifies the areas that are proposed for grassland restoration (crosshatching), with priority rankings. As many fields will be planted each year as resources allow, following the priority ranking. The fields marked as priority 1 will be demonstration plots, and should be planted as soon as possible.

Woodlot linkages and expansion (H2)
Several areas are ideal for linking and expanding the amount of forested area on the campground side of the park (H2) (Figure 4) by allowing natural succession in cultural meadows and implementation of a native tree planting program (Goodban 2002).

Vegetation Management Unit I

Woodlots

Vegetation management unit I is defined by vegetation community FODM2-2 (Figure 4). This area is located just north of the campgrounds and is classified as NE3 (Back Country Woodlot: natural environment zone) (OMNR 1998).

Figure 5: Priority Sites for Grassland Restoration

The objective of vegetation management unit I is to promote woodland expansion and increase corridors and linkages between existing woodlots by meeting the following target:

- Allow natural processes to continue without human intervention in the large woodlots (Back Country Woodlot), thereby promoting the retention of features such as cavity trees, organic material and downed woody debris, canopy gaps, super-canopy and mast-producing trees (OMNR n.d.[a], OMNR 2000[a], OMNR 1999[a]).

Vegetation Management Unit J

Campgrounds

Vegetation management unit J is defined by the campground facilities in the park (Figure 4) and is included in D2 (Gateway: development zone) (OMNR 1998). Most of this area is represented by vegetation community THDM2-4.

The objective of vegetation management unit J is to increase recreational opportunities by providing visual barriers and shade for park users, and enhancing the area aesthetically through the selective planting of native trees and shrubs. Oak, hickory, maple, and pine are native to the area and appropriate candidates for planting.

Planting in this area should be closely monitored to see if campers respect planting efforts and do not cut trees.

Vegetation Management Units M and PL

These vegetation management units relate to the Maintenance Area (M) and a number of parking lots (PL), being represented primarily by vegetation communities CVI_1, CGL_4 and CVC_2. No management of these areas will be undertaken as they are infrastructure areas to support park activities.

5.0 NON-NATIVE AND INVASIVE SPECIES MANAGEMENT

The *Bronte Creek Park Management Plan* states that only native species will be used for replanting, allowing for the control of invasive species in the natural environment, development and historical zones (OMNR 1998). Where uncertainties exist as to the threat of invasive species to the park ecosystem, monitoring and research to investigate the issues should be pursued in all park zones (OMNR 2001).

Of the 623 plant species listed in the *Life Science Inventory of Bronte Creek Provincial Park*, 165 are listed as having been introduced to the park (House and Carleton 1988). Of those 165 species, 64 are known to exhibit invasive tendencies under some circumstances based on the list of "Priority Invasive Plants in Southern Ontario" (Havinga *et al.* 2000) (Appendix 4).

Species in this list should be assessed for their distribution and extent in Bronte Creek, and a list of priority species be developed for management actions based on their ecological threat to the park and the feasibility of effective control, with priority being given to those species that pose the greatest threat and are the easiest to control (OMNR 2001). It is not realistic to expect that all invasive species can be removed from the park, as some are very difficult to control and are naturalized throughout the entire park. Actions to prevent further introductions into the park include:

- Using native species in plantings;
- Eradicating invasive species when they first appear (Havinga *et al.* 2000).

Invasive species management prescriptions for selected invasive species can be seen in Appendix 5. Additional prescriptions will be appended to this plan as required.

6.0 SPECIES AT RISK

Ontario Parks Policy PM11.03.02 states that the "preservation of species at risk in provincial parks is an inherent part of the Provincial Parks system's protection objective". The policy further states that "in certain cases, passive management (i.e., non-intervention) of species at risk and habitat will not guarantee the perpetuation of that species. If this is determined, then active management will be prescribed" (OMNR 2001).

Currently there are two records of plant species listed by COSEWIC / COSSARO occurring at Bronte Creek Provincial Park: Butternut (endangered) and Dense Blazing Star (threatened) (Appendix 6). There are also two species that are considered to be provincially "rare to uncommon" (S3), one species considered "very rare" (S2), and 26 species that are rare in the Halton Region (Appendix 6) (Dougan and Associates 2002).

6.1 Butternut (Juglans cinerea)
(G3G4 / S3? Endangered not regulated)

Butternut is listed on the Species at Risk in Ontario (SARO[1]) list as endangered (not-regulated) and is at risk because of Butternut canker (*Sirococcus clavigignenti-juglandacearum*). Butternut canker spreads rapidly and infects trees of all ages and sizes, infecting trees through leaf scars, buds, lenticels and wounds (COSEWIC 2003). Trees do not show obvious symptoms until the disease begins to colonize and kill the inner bark (FGCA 2005). The Forest Gene Conservation Association (2005) describes signs and symptoms of Butternut canker as:

- Dying branches in the upper, sunlit crown (shaded branches die off normally);
- Sunken, elongated, diamond-shaped cankers, dark brown to black in colour, found on the branches or the stem;
- Older cankers may show successive rings of callus loosely covered with shredded bark;
- In spring, a thin black fluid oozes from cracks in the bark;
- In summer, fall and winter, the black fluid leaves a dried sooty stain on the outside of the bark and the canker site;
- Underneath the bark, the wood is stained dark brown to black in a diamond shape;
- Epicormic[2] branching below dead or infected areas on stem or branches.

Butternut is generally found growing as scattered individuals or in small groups and usually makes up only a small component of hardwood forests (COSEWIC 2003). In Bronte Creek Provincial Park Butternut is found in association with the river valley near the valley rim on slope and floodplain communities (House and Carleton 1988).

6.1.1 Management of Butternut

There is no known cure for Butternut canker (OMNR 1996). Park managers can conserve Butternut within Bronte Creek by protecting disease-resistant trees and promoting regeneration of the species.

Butternut is shade-intolerant and park managers can promote natural regeneration by creating openings in the canopy to increase germination and seedling survival in areas where the species occurs. Ideal canopy openings to promote natural butternut regeneration have a diameter equal to the height of the stand (FGCA 2005). Controlling competition can also increase the survival rate of established seedlings (OMNR 1996). Care should be taken when felling trees in the vicinity of Butternut as damage may make them more susceptible to the disease.

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[1] **SARO:** Species at Risk in Ontario List – The official list of status designations assigned to native Ontario species by the Ontario Ministry of Natural Resources, used in the application of provincial legislation and policy for the protection of species at risk and their habitat.

[2] **Epicormic shoot / branching** – "A shoot arising from a dormant or adventitious bud on the stem or branch of a woody plant" (CFS, 1995).

6.1.2 Planting

Seed from disease-resistant trees should be collected and planted in Bronte Creek. Butternut grows well in deep, moist, well drained soils and is often found along stream banks, gradual slopes along fence lines or in open fields (Appendix 8) (OMNR 1996).

6.2 Dense Blazing Star (Liatris spicata)
(G5/S2 Threatened)

Dense Blazing Star is endemic to eastern North America and is listed as threatened on the SARO list because of habitat loss, agricultural development and activities (CWS 1999).

It is a perennial herb growing up to 1.5 m tall with a smooth stem, leaves arranged in a spiral and purple or white flowers that grow on a spike and bloom from the top down (CWS 1999). Dense Blazing Star is found on moist prairies and savannahs, dune swales and abandoned fields on coarse loam or sandy loam soils (CWS 1999). Small populations of the species at Bronte Creek are found in association with tallgrass prairie communities (Dougan and Associates 2002).

Dense Blazing Star is shade-intolerant and is generally found in areas that have been disturbed by fire, flooding or drought (CWS 1999). At Bronte Creek, natural succession and fire suppression have resulted in higher densities of woody vegetation in prairie remnants, and are threatening the species (Dougan and Associates 2002). It is expected that management prescriptions to maintain and enhance tallgrass prairies (G1) and tallgrass woodlands (G4) (Figure 4) will be complementary to Dense Blazing Star (Dougan and Associates 2002).

It is also expected that these management prescriptions will be beneficial and complementary for Mottled Duskywing (*Erynnis martialis*) (S2) and its host species, New Jersey Tea (*Ceanothus americanus*) (Dougan and Associates 2002).

6.3 Henslow's Sparrow (Ammodramus henslowi)
(G4/S1 Endangered regulated)

Henslow's Sparrow is listed as endangered (regulated) on the SARO list, the species and its habitat receiving legal protection under the provincial *Endangered Species Act* (ESA). Henslow's Sparrow is found in open abandoned fields with few trees or shrubs and old pastures that are not grazed or lightly grazed, preferably greater than 55 ha in size. (Austen *et al.* 1997). Ideal habitat is dense grassland at least a half metre tall with a thick mat of ground cover from previous year's growth and low-lying wet areas nearby (Environment Canada 2006). The vegetation should be made up of grasses, sedges and scattered weedy, forb stalks or low-lying shrubs for song perches (Environment Canada 2006). The species is designated as endangered because of declining numbers at breeding sites and is believed to be at risk from loss of old field habitat due to changes in agricultural practices, urbanization and succession of fields to thicket and forest (Austen *et al.* 1997).

Bronte Creek Provincial Park provides probable nesting habitat for Henslow's Sparrow as there are records of two singing males in old fields in the north section of the park in the year 2000 (Goodban 2002). Follow-up field surveys in 2001 did not reconfirm the species.

Old fields where Henslow's Sparrows have been documented should be maintained as surrogate grasslands because of their potential as nesting habitat for the species (Figure 4: Vegetation Management unit H1a-d) by:

- Maintaining a maximum of 5% woody cover throughout this vegetation management unit;
- Creating native grassland habitat greater than 100 ha in size;
- Implement a rotational mowing or prescribed burning program in Vegetation Management units H1a and H1b; on a 3-year rotation in areas less than 30 ha in size;
- Use a brush hog to sloppy cut fields (height of 12 cm), leaving some standing vegetation for perches and thatch on the ground;

- Conducting management actions before birds arrive (April 15), or after chicks have fledged (Sept. 15);
- If monitoring does not indicate that birds are nesting in the area, mowing may be conducted in late July/ August to allow vegetation to grow before winter, providing residual cover in the spring;
- Habitat can be further enhanced by removing fence rows to create larger contiguous tracts of habitat in the winter (Dougan and Associates 2002; Environment Canada 2006).

Henslow's Sparrows are sensitive to disturbance such as fire and mowing and have been known not to return to an area for one year after a disturbance (Environment Canada 2006). As such, no more than half of the tallgrass habitat should be burned in a given year.

Old field management (mowing / prescribed burning) should begin in vegetation management unit H1b once suitable habitat has become established for Henslow's Sparrows in adjacent fields. Vegetation management unit H1b has remained largely undisturbed since the Henslow's Sparrow sightings in 2000. Adjacent Vegetation Management units are currently cultivated (H1c and H1d) or partially mowed (H1a) and require time to become suitable habitat for the species (Figure 4).

7.0 RESEARCH AND MONITORING

Research projects within Bronte Creek will be encouraged where they improve knowledge, management practices and protection objectives of the park. Research activities must be approved and be consistent with PM 2.45. Vegetation management prescriptions will be monitored to evaluate goals and objectives and to determine if modifications are necessary. Where possible, park staff will use standardized data forms and inventory and monitoring protocols to ensure information is collected in a consistent manner. Inventory and monitoring that should be implemented in the park include:

- Establishment of long-term ecological monitoring sites;
- Evaluation of the threat of non-native forest insects and diseases, with emphasis on Butternut canker;
- Monitoring species at risk found in the park;
- Inventorying and monitoring of invasive species and invasive species removal programs;
- Monitoring the ecological condition of campgrounds.

7.1 Butternut Monitoring

An inventory of Butternut within Bronte Creek should be conducted to assess general health of the trees and the number infected with Butternut canker, making special note of disease-resistant trees using methods outlined by Ostry *et al.* (1994). Trees inventoried should be described by:

- Age, vigour, percentage live crown (FGCA 2005);
- Percentage main stem affected by cankers using USDA Tree Retention Guidelines, which are as follows:

  USDA Tree Retention Guidelines 70-20-50 Rule (Ostry *et al.* 1994):

  - Trees with greater than 70% live crown and less than 20% of the combined circumference of the bole and root flares affected by cankers;
  - Trees with at least 50% live crown and no cankers on bole or root flares.

7.2 Tallgrass Prairie / Woodland Monitoring

Vegetation should be monitored prior to, the summer of, and for two consecutive summers after implementing a prescribed burn or mowing program in the tallgrass and woodland prairies (Johnson *et al.* 2003). To assess the response of native vegetation such as Dense Blazing Star and prairie grasses to vegetation management prescriptions. Monitoring will follow the procedures described in *Monitoring the Effects of Prescribed Burns in Oak Savannahs and Woodlands: Field Methods* (Johnson *et al.* 2003). The monitoring protocol involves three passes along transects at different times of the year: monitoring native prairie forbs, tree seedlings, saplings and stand composition in the first pass, shrubs in the second pass and grasses in the third pass (Johnson *et al.* 2003).

The protocol designed by Johnson *et al* (2003) is currently being revised and future monitoring should follow the revised protocol once completed.

Prescribed burning may stimulate the growth of weeds and undesirable woody vegetation which may require further control. Monitoring will also assist in determining ideal timing and frequency of prescribed burns and mowing.

7.3 Old Field Monitoring

Rotational mowing should be monitored in conjunction with bird census data to aid in determining timing and frequency of mowing to provide optimal habitat for species at risk. Vegetation should be monitored using belt transects and include:

- Vegetation composition (native and invasive species);
- Vegetation height;
- Depth of thatch;
- Amount of exposed soil;
- Presence of woody species;
- Potential for disturbance;
- Distance to the horizon;
- Presence of roads, dwellings, fence lines and trails (Environment Canada 2006).

7.4 Henslow's Sparrow

Henslow's Sparrows can be difficult to detect as they tend to sing at night. They do, however, respond well to play-back recordings. Singing begins approximately one half hour before sunset, and stops approximately one half hour after sunrise, with singing intensity greatest at dawn and dusk (Environment Canada 2006). Suitable Henslow's Sparrow habitat can be monitored at Bronte Creek by the following procedures:

- Conducting several site visits (minimum 2-3) in suitable habitat beginning in late May;
- Conduct a second visit to suitable habitat a minimum of two weeks later in June or early July;
- A third visit can be conducted if birds were detected in second visit only;
- Monitoring should be conducted in fair weather (no rain, fog or wind) when other grassland birds have finished singing;
- Separate census stations by at least 200 m;
- Maintain a record of survey results.

Any standardized monitoring protocols developed by the Henslow's Sparrow Recovery Team in the future will be followed (Environment Canada 2006).

8.0 IMPLEMENTATION PRIORITIES

Implementation of the vegetation management plan shall occur in an ecologically sustainable manner. All requirements of the *Environmental Assessment Act*, *Environmental Bill of Rights*, *Endangered Species Act*, *Provincial Parks and Conservation Reserves Act* and other pertinent legislation will be met. Implementation and/or site plans will precede any development or resource stewardship initiatives, with an appropriate level of consultation. Vegetation management projects will be contingent upon the availability of funding and unforeseeable changes in priorities or park policy.

All vegetation management projects will be undertaken in accordance with the requirements of *A Class Environmental Assessment for Provincial Parks and Conservation Reserves.*

The following are implementation priorities of vegetation management prescriptions at Bronte Creek Provincial Park and will be subject to funding, staffing and available resources:

- Old field habitat enhancement and native grassland restoration;
- Monitoring species at risk;
- Monitoring forest insects and disease (Butternut canker and others that may arise in future);
- Implement prescribed burn and mowing plans for tallgrass and woodland prairies;
- Buffer planting around park boundary;
- Establish long-term ecological monitoring sites;
- Implement a planting program to improve wildlife corridors, woodlot linkages and recreational potential of day use areas.

9.0 SUMMARY OF CONSULTATION AND ENVIRONMENTAL ASSESSMENT REQUIREMENTS FOR IMPLEMENTATION

Ontario Parks announced its intention to undertake a vegetation management planning project for Bronte Creek Provincial Park in early March 2007. The initial notice was mailed to 783 individuals and interest groups inviting public participation.

In late March 2007, a paid advertisement and notice were prepared highlighting the release of the *Draft Bronte Creek Vegetation Management Plan*. The notice was mailed to 658 individuals and interest groups. Copies of the draft plan were made available by download from the Ontario Parks' website, http://www.ontarioparks.com/english/invit.html, or by request for printed copies. Ontario Parks' staff considered all comments received during the 45-day consultation period.

The release of the approved *Bronte Creek Vegetation Management Plan* was announced in March, 2008. A paid advertisement was placed in area newspapers and a notice was mailed to 554 individuals and interest groups that participated in the planning process. The approved plan was made available by download from the Ontario Parks' website: http://www.ontarioparks.com/english/invit.html, or by request for printed copies. Implementation of the plan can proceed within 45 days following release of the approved plan.

10.0 PLAN AMENDMENT AND REVIEW

The *Bronte Creek Vegetation Management Plan* for Bronte Creek Provincial Park may be reviewed as required to address changing issues or conditions. Additional species-specific or ecosystem-specific management prescriptions may be added to the document at a later date.

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APPENDIX 1: Site Conditions Documentation Checklist

Site conditions should be well documented before the implementation of management prescriptions and should include as a minimum (Rodger 1998):

- Date
- Photographs (before and after)
- GPS Co-ordinates / mapping and site sketch
- Size and location
- Physical features
- Human – made features
- Soils
- Significant cultural features
- Species inventories / composition and density
- Presence of SAR
- Presence of invasive species
- Adjacent land uses
- Current threats
- Official park zoning
- Management constraints and opportunities
- Timing restrictions
- Assess vegetation management prescriptions against the projects in Appendix 2 of the Class EA-PPCR to determine if the project is a Category A or if the project requires further screening.

Management prescriptions should be monitored and evaluated to determine if management actions are obtaining desired results. Staff carrying out site documentation and monitoring should be given the proper level of training. Because each of the management prescriptions presents its own unique challenges, the zone ecologist should be consulted in the development of monitoring protocols.

APPENDIX 2: Dead and Dangerous Trees Treatments

The following serve as guidelines for actions to be taken for the removal of dead and hazardous trees (OMNR 2001):

1. *No Action Required*

No action is required for trees under the following circumstances:

- Dead or living trees which are leaning away from trails and facilities, providing that the turned up root mass will not cause damage to the trails or roads;
- Standing dead trees of species resistant to rot (i.e., hardwoods other than crotched oaks) which have a sound trunk and limbs and are not leaning towards trails, roadways or facilities, or located within the campground;
- Trees within naturalized areas which do not pose a risk to facilities, trails or roads outside of the area.

2. *Thinning of Crown*

A potentially hazardous tree may be treated by removal of selected limbs in the crown (i.e., thinning) when the trunk and base are sound and one of the following situations exists:

- The tree has a slight lean or shows signs of shifting (heaving or cracking of soil). Removing part or all of the crown will reduce its weight and the stress on the lower trunk roots;
- Weakness and rot are restricted to the upper crown/limbs; and/or
- Limbs are interfering with power lines or buildings.

This treatment is particularly effective with oak species, which may sprout vigorously after having the upper trunk or limbs removed.

3. *Cut Top and Upper Limbs Leaving Bare Trunk*

This is the preferred method for trees with significant rot or weakness in the crown or upper limbs that are located in campground areas. This method involves trimming back the crown and limbs to the main trunk(s) and limbs thus relieving tension on the root system, greatly reducing the possibility of the tree falling, while still providing valuable wildlife habitat, providing the base is sufficiently sound. This option should be used under the following circumstances:

- Tree in question is a softwood or crotched;
- Rot is present in the trunk, but enough sound wood is left to support the bare trunk.

4. *Felling*

Felling of a hazardous tree is the final recourse when options 1 to 3 are deemed inadequate to assure safety of the park users and facilities. Complete removal is necessary only when:

- The butt or roots will not provide support to a bare trunk;
- The tree is leaning such that complete failure of the root system is imminent, or such that a hazard is created by the uplifted roots; and/or
- There is substantial cracking in the trunk indicating that the tree will likely fall with wind or ice accumulation;
- Soil is too thin to support the tree.

In nature reserve, natural environment and historical zones, felled trees will be left in place to retain biomass on site, provided that they do not impede pedestrian or vehicular traffic, or create a safety hazard (OMNR 2001). In exceptional circumstances when there are a significant number of downed trees in one location (i.e., due to a large blowdown), some trees may be removed to the central composting site so long as they may be removed without damage to other vegetation.

In all other zones, felled trees will be left in place or removed at the superintendents discretion (See Section 4.1.1) provided that they do not impede pedestrian or vehicular traffic or create a safety hazard (OMNR 2001). Felling and cutting will be carried out by staff with proper training.

APPENDIX 3: General Buffer / Windbreak Planting Guidelines

(OMNR 1995, OMNR 1995[a])

Density

Low	Light can be seen through greater than half the buffer's face;
Medium	Light spread evenly through half the buffer's face;
High	Light can be seen through less than half the buffer's face (OMNR 1995).

Width

- The width of the buffer will affect its density;
- Where it is determined that a second row or more is required, 2.5 m should be left between rows to allow for the access of machinery between rows (OMNR 1995[a]).

Spacing

- Spacing of the planting is dependent on the objective for that particular area;
- For visual barriers plant trees 1 m apart to allow for natural mortality (OMNR 1995);
- As crowns begin to touch, thin every second tree (OMNR 1995);
- For other spacing / rows guidelines, see (OMNR 1995[a]);
- Where rows are not desirable, trees can be planted in a random fashion (OMNR 1995[a]);
- If a mix of species is being used, plant species in square or circular fashion to ensure trees in the center of a cluster are not out-competed by neighbouring species (OMNR 1995[a]).

Planting

- Plant trees within two days of receiving them (OMNR 1995[a]);
- Store seedlings / trees in the shade and water as needed (OMNR 2000).
- Plant trees in the spring and fall to increase their chance of survival.

APPENDIX 4: Invasive Plants at Bronte Creek Provincial Park

Adapted from (House and Carlton 1988, Havinga *et al.* 2000)

Scientific Name	Common Name	Effect on Natural Area
Category 1 - Species that exclude all other species and dominate sites indefinitely. They may be difficult to control and tend to disperse widely.		
Acer negundo	Manitoba Maple	Invades all natural areas
Alliaria petiolata	Garlic Mustard	Dominates forest herb layer
Rhamnus cathartica	Common Buckthorn	Dominates forest understory, meadows and prairies
Rhamnus frangula	Glossy Buckthorn	Dominates wetlands and found on tablelands
Morus alba	White Mulberry	Hybridizes with *M. rubra*
Elaeagnus umbellate	Autumn Olive	Dominates forest edges
Lonicera morrowii	Morrow's Honeysuckle	Invades meadows and forest edges
Lonicera tatarica	Tartarian Honeysuckle	Invades meadows and forest edges
Rosa multiflora	Multiflora Rose	Dominates forest edge
Cirsium arvense	Canada Thistle	Dominates meadows, prairies and forest edges
Hesperis matronalis	Dame's Rocket	Dominates open forest understory and meadows
Lycopos europaeus	Bugleweed	Invades wetlands, displaces native Lycopus spp.
Lythrum salicaria	Purple Loosestrife	Dominates wetlands
Category 2 - Species that are highly invasive and tend to dominate certain niches.		
Acer platanoides	Norway Maple	Dominates forest canopy
Pinus sylvestris	Scots Pine	Invades meadows
Populus alba	White Poplar	Invades meadows
Syringa vulgaris	Lilac	Dominates shallow limestone areas
Galium mollugo	White Bedstraw	Invades meadows
Lotus corniculatus	Bird-foot Trefoil	Dominates meadows and prairies
Lysimachia nummularia	Moneywort	Dominates wet forest understory
Melilotus alba	White Sweet Clover	Dominates meadows and prairies
Melilotus officinalis	Yellow Sweet Clover	Dominates meadows and prairies
Poa pratensis	Kentucky Bluegrass	Dominates prairies
Robinia pseudo-acacia	Black Locust	Invades meadows
Vicia cracca	Cow Vetch	Dominates meadows and prairies
Category 3 - Species that are moderately invasive, but can become locally dominant.		
Aesculus hippocastanum	Horse-chestnut	Invades forests
Salix alba	White Willow	Invades wetlands, displaces native *Salix* species
Salix fragilis	Crack Willow	Invades wetlands, displaces native *Salix* species
Salix Xrubens	Willow hybrid	Invades wetlands, displaces native *Salix* species
Salix Xsepulcralis	Willow hybrid	Invades wetlands, displaces native *Salix* species
Berberis vulgaris	Common Barberry	Invades forests
Berberis thunbergii	Japanese Barberry	Invades forests
Solanum dulcamara	Bittersweet Nightshade	Invades forests and wetlands
Barbarea vulgaris	Yellow Rocket	Invades meadows
Berteroa incana	Hoary-alyssum	Invades prairies
Convallaria majalis	Lily-of-the-valley	Invades forest understory
Convolvulus arvensis	Field Bindweed	Dominates meadows
Dactylis glomerata	Orchard Grass	Invades meadows and prairies
Dipsacus fullonum	Teasel	Dominates meadows and prairies
Festuca arundinacea	Tall Fescue	Dominates moist meadows and prairies
Hieracium aurantiacum	Orange Hawkweed	Invades meadows

Scientific Name	Common Name	Effect on Natural Area
Hieracium caespitosum	Yellow Hawkweed	Invades meadows
Hieracium x floribundum	Pale Hawkweed	Invades meadows
Pastinaca sativa	Wild Parsnip	Invades meadows
Ranunculus repens	Creeping Buttercup	Invades moist meadows
Saponaria officinalis	Bouncing-bet	Invades meadows
Tanacetum vulgare	Tansy	Invades meadows
Vicia sativa	Common Vetch	Invades meadows
Category 4 - Species that compete with native vegetation and become difficult to eradicate.		
Ligustrum vulgare	Privet	Invades forest edges
Ajuga reptans	Creeping Bugleweed	Persists in forest understory and edges
Bromus inermis	Smooth Brome	Resists conversion to native meadow and prairie
Glechoma hederacea	Ground Ivy	Competes with meadow and prairie species
Hemerocallis fulva	Orange Day Lily	Dominates meadows
Hypericum perforatum	St. John's Wort	Can dominate meadows
Malva moschata	Musk Mallow	Invades meadows
Medicago lupulina	Black Medick	Invades meadows
Medicago sativa	Alfalfa	Invades meadow and prairies
Mentha Xpiperita	Pepper Mint	Invades meadows
Myosotis scorpioides	True Forget-me-not	Dominates shaded seepage areas
Nepeta cataria	Catnip	Invades meadows
Rumex acetosella	Sheep Sorrel	Invades meadows
Setaria spp.	Foxtail Grass	Invades meadows
Trifolium pratense	Red Clover	Invades meadows
Trifolium repens	White Clover	Invades meadows
Potentially invasive species to monitor		
Prunus avium	Bird Cherry	
Phalaris arundinacea	Reed Canary Grass	Dominates wet meadows; status as native or exotic uncertain. Given certain conditions can become invasive.

APPENDIX 5: Invasive Species Control Techniques

Species	Habitat	Reproduction and Dispersal	Control Methods
Garlic Mustard (*Alliaria petiolata*)	River floodplains, forests, roadsides, wooded edges and forest openings. (Havinga *et al.* 2000)	- Biennial (living two years) rosette and leaves are formed during first half of two-year cycle. - In second spring rosettes develop into mature plants that flower, produce seed and die by late June. - A single plant produces thousands of seeds. - Dispersal of seed can be several metres away from plants. - Spreads rapidly, and can displace native plants within 10 yrs. (Havinga *et al.*, 2000)	*Cutting* (Havinga *et al.* 2000) - Cut before flowering to prevent seed production. - 2-5 yr. treatments required to eliminate seed production. - Cutting can be used on small infestations. *Burning* - Stimulates germination of stored seeds and seedling growth. - Must be used annually for 3-5 years to control growth. *Herbicide Application* - Glyphosate can be used for large infestations. - Apply glyphosate in mid-spring. - Glyphosate can be applied in mid-spring and fall to rosettes as long as temperature is above 10°C.
Common Buckthorn (*Rhamnus cathartica*)	Open areas, disturbed forest edges, ravines, forests and wetlands. Shade-tolerant, needs light to be released in the canopy. (Havinga *et al.* 2000)	- Will germinate in the shade or sunshine. - Primarily vegetative from roots. - Prolific seed production; seed dispersed by birds. - Produces seed from a young age and is able to form a persistent seed bank. - Root suckers vigorously from cut stumps (Havinga *et al.* 2000).	*Cutting* (Havinga *et al.* 2000) - Cut after peak flowering (May-July). - Follow up with glyphosate application (30%) solution to cut stumps immediately after cutting. - Re-sprouts can be treated 6 weeks after cutting with wick applicator. - Basal bark application with 8% triclopyr. *Herbicide* - EZ Ject Lance
Canada Thistle (*Cirsium arvense*)	Disturbed areas, cultivated fields, pastures, roadsides, shorelines, forest openings, savannahs and prairies (Havinga *et al.* 2000).	- Primarily vegetative from root system. - Root suckers reproduce vigorously from cut plants. - Reproduces from root stem fragments. - Patches can spread 1-2 m per year. - Vertical roots can grow as deep as 6.8 m. - Horizontal roots can spread as much as 6m in one season (Havinga *et al.*, 2000)	(Havinga *et al.* 2000) - One or more methods of control are often required. - Target killing established clones; targeting seed set is a secondary consideration. *Cutting* (Havinga *et al.* 2000) - Mowing plants can be effective but often takes several years. *Burning* - Burn in late spring; often requires several years to control. *Herbicide Application* - Deep roots make herbicide control with glyphosate difficult (Havinga *et al.* 2001).

APPENDIX 6: Rare Species at Bronte Creek Provincial Park

(Goodban 2002)

SCIENTIFIC NAME	COMMON NAME	CONSERVATION STATUS		
		COSEWIC / MNR / NHIC	OMNR Central Region	Halton Region
Day Use Side				
Juglans cinerea	Butternut	Endangered G3-G4 / S3?		
Campground Side				
Liatris spicata	Dense Blazing Star	Threatened G5 / S2	Rare	Rare
Desmodium cuspidatum	Bracted Tick-trefoil	G5 / S3	Rare	Rare
Linum virginianum	Smooth Yellow Flax	G5 / S2	Rare	Rare
Panicum villosissimum	White-haired Panic Grass	G5 / S3	Rare	Rare
Carex grayi	Gray's Sedge	G4 / S4	Rare	Rare
Lespedeza capitata	Round-headed Bush-clover	G5 / S4	Rare	Rare
Lespedeza hirta	Hairy Bush-clover	G5 / S4	Rare	Rare
Lespedeza intermedia	Wand-like Bush-clover	G5 / S4	Rare	Rare
Orobanche uniflora	One-flowered Cancer-root	G5 / S4	Rare	Rare
Quercus muehlenbergii	Chinquapin Oak	G5 / S4	Rare	Rare
Amelanchier alnifolia var. humilis	Low Shadbush	G5 / S4?		Rare
Andropogon gerardii	Big Bluestem	G5 / S4		Rare
Apios americana	Ground-nut	G5 / S5		Rare
Arctostaphylos uva-ursi	Bearberry	G5 / S5		Rare
Asclepias tuberosa	Butterfly Milkweed	G5? / S4		Rare
Aster oolentangiensis	Sky-blue Aster	G5 / S4		Rare
Brachyeletrum erectum	Bearded Shorthusk	G5 / S4-S5		Rare
Calystegia spithamaea	Low Bindweed	G4-G5 /S4-S5		Rare
Carex rugosperma	Wrinkle-seeded Sedge	----		Rare
Corallorhiza maculata	Spotted Coral-root	G5 / S5		Rare
Elymus canadensis	Canada Wild-rye	G5 / S4-S5		Rare
Elymus riparius	Riverbank Wild-rye	G5 / S4		Rare
Elymus trachycaulus	Slender Wheat-grass	G5 / S5		Rare
Lechea intermedia	Pinweed	G5 / S4		Rare
Polygonum virginianum	Jumpseed / Virginia Knotweed	G5 / s4		Rare
Platanus occidentalis	Sycamore	G5 / S4		Rare
Polygala verticillata	Whorled Milkweed	G5 / S4		Rare
Sassafras albidum	Sassafras	G5 / S4		Rare
Schizachyrium scoparium	Little Bluestem	G5 / S4		Rare
Viola fimbriatula	Northern Downy Violet	----		Rare

APPENDIX 7: NHIC Conservation Ranks (NHIC 2005)

Global (G) and provincial (S) conservation ranks are determined by the number of known and extant sites of a species and the degree to which they are considered to be threatened with destruction. Other criteria include number of known protected populations, population size and the ability of the species to persist at the site (NHIC, 2005).

Global Ranks

GRanks	*Definition*
G1	**Extremely rare;** usually 5 or fewer occurrences in the overall range or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.
G2	**Very rare;** usually between 5 and 20 occurrences in the overall range or with many individuals in fewer occurrences; or because of some factor(s) making it vulnerable to extinction.
G3	**Rare to uncommon**; usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
G4	**Common**; usually more than 100 occurrences; usually not susceptible to immediate threats.
G5	**Very common**; demonstrably secure under present conditions.
GH	**Historic**; no records in the past 20 years.
GU	Status **uncertain**, often because of low search effort or cryptic nature of the species; more data needed.
GX	**Globally extinct**; no recent records despite specific searches.
?	Denotes inexact numeric rank (i.e., G4?).
G	A "G" (or "T") followed by a blank space means that the NHIC has not yet obtained the Global Rank from The Nature Conservancy.
G?	**Unranked**, or, if following a ranking, rank tentatively assigned (e.g., G3?).
Q	Denotes that the taxonomic status of the species, subspecies or variety is **questionable**.
T	Denotes that the rank applies to a subspecies or variety.

Provincial Ranks

Pranks	*Definition*
S1	**Extremely rare** in Ontario; usually 5 or fewer occurrences in the province or very few remaining individuals; often especially vulnerable to extirpation.
S2	**Very rare** in Ontario; usually between 5 and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.
S3	**Rare to uncommon** in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.
S4	**Common** and apparently secure in Ontario; usually with more than 100 occurrences in the province.
S5	**Very common** and demonstrably secure in Ontario.
SH	**Historically** known from Ontario, but not verified recently (typically not recorded in the province in the last 20 years); however, suitable habitat is thought to be still present in the province and there is reasonable expectation that the species may be rediscovered.
C	**Captive/Cultivated**; existing in the province only in a cultivated state; introduced population not yet fully established and self-sustaining.
S?	**Not ranked yet**, or if following a ranking, rank uncertain (e.g., S3?). S? species have not had a rank assigned.
SA	**Accidental**; of accidental or casual occurrence in the province; far outside its normal range; some species may occasionally breed in the province.
SAB	Breeding accidental.
SAN	Non-breeding accidental.
SE	**Exotic**; not believed to be a native component of Ontario's flora.
SR	**Reported** for Ontario, but without persuasive documentation which would provide a basis for either accepting or rejecting the report.
SRF	**Reported falsely** from Ontario.

SU	**Un-rankable**, often because of low search effort or cryptic nature of the species; there is insufficient information available to assign a more accurate rank; more data is needed.
SX	Apparently **extirpated** from Ontario, with little likelihood of rediscovery; typically not seen in the province for many decades, despite searches at known historic sites.
SZ	Not of practical conservation concern inasmuch as there are no clearly definable occurrences; applies to long-distance migrants, winter vagrants, and eruptive species, which are too transitory and/or dispersed in their occurrence(s) to be reliably mapped; most such species are non-breeders; however, some may occasionally breed.
SZB	Breeding migrants/vagrants.
SZN	Non-breeding migrants/vagrants.

The above are not legal status designations and the Species at Risk in Ontario List (SARO) should be consulted for official status designations used in the application of provincial legislation and policy.

Status Categories and Definitions for Ontario Species at Risk on SARO List

OMNR Status		Definition
EXT	**Extinct**	A species that no longer exists anywhere.
EXP	**Extirpated**	A species that no longer exists in the wild in Ontario but still occurs elsewhere.
END-R	**Endangered (Regulated)**	A species facing imminent extinction or extirpation in Ontario which has been regulated under Ontario's Endangered Species Act (ESA).
END	**Endangered (Not Regulated**	A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's ESA.
THR	**Threatened**	A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
SC	**Special Concern** [Formerly Vulnerable]	A species with characteristics that make it sensitive to human activities or natural events.
NAR	**Not at Risk**	A species that has been evaluated and found not to be at risk.
DD	**Data Deficient** [Formerly Intermediate]	A species for which there is insufficient information for a provincial status recommendation.

APPENDIX 8: Butternut Planting Guidelines

(OMNR 1996)

- Butternut can be planted in the spring and fall from collected nuts;
- Do not let seeds dry out. Seed with moisture content below 20% will not germinate with much success;
- Fall and spring planted seed should germinate in May although some may take 2-3 years.

Husking

- Husking is not necessary but increases chance of germination;
- Husks can also be softened by pouring boiling water over them, allowing them to be soaked overnight and planted the next day.

Mechanical Huller

- Available through nut growing associations.

Cement Mixer

- Place equal amounts of nuts and water in the mixer;
- Run mixer until the blades have removed the husks.

Hose

- Store seeds in a plastic bag and refrigerator for two-three weeks until they are dark and soft;
- Wash husks off with a pressure washer.

Fall Planting

1. Collect nuts in September and early October;
2. Remove or soften the husks;
3. Plant the nuts in an open area at a depth of one to two times their thickness;
4. For best results, place mulch over planted seed to prevent freezing and thawing;
5. Remove mulch in April to let seedbed warm and allow seeds to germinate.

Spring Planting

Spring planting is more labour-intensive and difficult than fall planting. Seeds will need to be stratified[3] over the winter to mimic the temperature and humidity changes a seed would experience naturally.

1. Remove husks.
2. Air dry nuts until moisture content is 20%.
3. When 20% moisture content is reached, store nuts in dark coloured polyethylene bags and refrigerate at 2-5 degrees Celsius.
4. 90-120 days before planting, begin stratification (usually end of January).
5. Remove nuts from refrigerator and soak in water (preferably aerated) for 48 hrs. Use two times the water as the volume of nuts.
6. Air-dry nuts, then place them in 4 mil dark coloured polyethylene bags with moist peat, sand or vermiculite at about two to four times the volume of the seed.
7. Seal the bags and place back in the refrigerator at a temperature of 2-5 degrees Celsius for 90-120 days.
8. Plant nuts.

Steps to determine moisture content of nuts	
Step 1	**Step 2**
- Select 10 fresh nuts.	- Weigh the entire batch of nuts to be dried. - Weight of fresh batch (Bw) = _____grams
- Weigh the sample	- Calculate the target weight of the batch to

[3] **Stratification:** "The storage of seeds under defined conditions of environment (temperature, moisture, gas exchange, medium, etc.) for specified periods in order to overcome passive or active inhibition of germination" (CFS, 1995).

- Weight of fresh sample (Sw)=_____grams	bring the moisture content down to 20% using the following formula: - Target weight (Tw) = (Bw x [1-Mc]) + ([Bw x Mc] x 0.2)
- Dry the sample in the oven at 100 degrees Celsius until the weight of the seeds remains constant. - Weight of dried sample(Sd) = _____grams	
- Calculate the amount of moisture (moisture content) in the sample. - Moisture content (MC) = Sw-Sd / Sw	
- Discard the sample.	

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